DECEMBER 1981
$2.00

PERSONAL COMPUTING

Take the trouble out of taxes

Expand your universe with local networks

Holiday gift-givers' guide

Take control through personal computing

Form 2106 — Employee Business Expenses (Please use Form 3903 to figure moving expense deduction.) — 1981

Department of the Treasury, Internal Revenue Service — ▶ Attach to Form 1040.

Your name: Raymond D. Granger | Social security number: 141 : 67 : 5524 | Occupation in which expenses were incurred: staff writer

Employer's name: Brooks Publishing Co. | Employer's address: 617 Westside Blvd. Brooks, ME 04632

Instructions

Use this form to show your business expenses as an employee during 1980. Include amounts:

- You paid as an employee;
- You charged to your employer (such as by credit card);
- You received as an advance, allowance, or repayment.

Several publications, available from IRS, give more information about business expenses:

Publication 463, Travel, Entertainment, and Gift Expenses.
Publication 529, Miscellaneous Deductions.
Publication 587, Business Use of Your Home.
Publication 508, Educational Expenses.

Part I.—You can deduct some business expenses even if you do not itemize your deductions on Schedule A (Form 1040). Examples are expenses for travel (except commuting to and from work), meals, or lodging. List these expenses in Part I and use them in figuring your adjusted gross income on Form 1040, line 31.

Line 2.—You can deduct meals and lodging costs if you were on a business trip away from your main place of work. Do not deduct the cost of meals you ate on one-day trips, when you did not need sleep or rest.

Line 3.—If you use your own car in your work, you can deduct the cost of the business use. Enter the cost here after figuring it in Parts IV, V, and VI. Base the cost on your actual expenses (such as gas, oil, repairs, depreciation) or on a mileage rate.

The mileage rate is 20 cents a mile up to 15,000 miles. After that, or for all business mileage on a fully depreciated car, the rate is 11 cents a mile. A car whose cost is being figured under the mileage rate is considered to have a useful life of 5 years. If in any year actual expenses are claimed using a useful life of less than 5 years, use of the mileage rate after that shorter useful life will be limited to 11¢ per mile. (For depreciation, see Publication 463.)

Figure your mileage rate amount and add it to the business part of what you spent on the car for parking fees, tolls, interest, and State and local taxes (except gasoline tax).

Line 4.—If you were an outside salesperson with other business expenses, list them on line 4. Examples are selling expenses or expenses for stationery and stamps. An outside salesperson does all selling outside the employer's place of business. A driver-salesperson whose main duties are service and delivery, such as delivering bread or milk, is not an outside salesperson. (For outside salesperson, see Publication 463.)

Line 5.—Show other business expenses on line 5 if your employer repaid you for them. If you were repaid for part of them, show here the amount you were repaid. Show the rest in Part II.

Part II.—You can deduct other business expenses only if (a) your employer did not repay you, and (b) you itemize your deductions on Schedule A (Form 1040). Report these expenses here and under Miscellaneous Deductions on Schedule A. Examples are union or professional dues and expenses for tools and uniforms. (For details, see Publication 529.)

You can deduct expenses for business use of the part of your home that you exclusively and consistently use for your work. If you are not self-employed, your working at home must be for your employer's convenience. (For business use of home, see Publication 587.)

If you show education expenses in Part I or Part II, you must fill out Part III.

Part III.—You can deduct the cost of education that helps you keep or improve your skills for the job you have now. This includes education that your employer, the law, or regulations require you to get in order to keep your job or your salary. Do not deduct the cost of study that helps you meet the basic requirements for your job or helps you get a new job. (For education expenses, see Publication 508.)

Part V.—If you trade in a car you used in business for a new one you also used in business, fill out lines 1 through 15. If you paid cash for the new car or traded in a car not used in business, fill out only lines 10 through 15. Refigure the basis for depreciation each year in the future that your percentage of business use changes.

PART I.—Employee Business Expenses Deductible in Figuring Adjusted Gross Income on Form 1040, Line 31

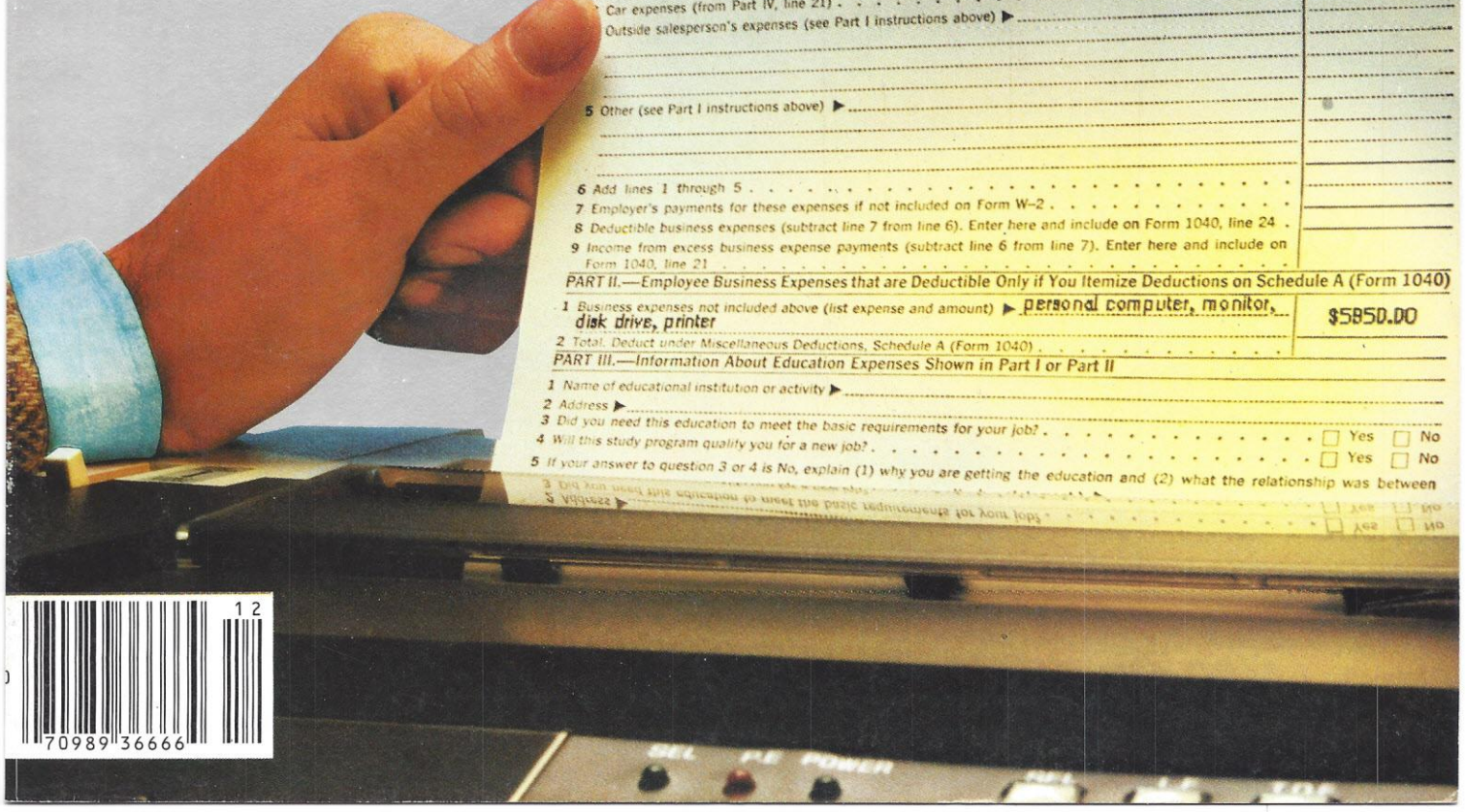
1 Fares for airplane, boat, bus, taxicab, train, etc.	
2 Meals and lodging	
3 Car expenses (from Part IV, line 21)	
4 Outside salesperson's expenses (see Part I instructions above) ▶	
5 Other (see Part I instructions above) ▶	
6 Add lines 1 through 5	
7 Employer's payments for these expenses if not included on Form W-2	
8 Deductible business expenses (subtract line 7 from line 6). Enter here and include on Form 1040, line 24	
9 Income from excess business expense payments (subtract line 6 from line 7). Enter here and include on Form 1040, line 21	

PART II.—Employee Business Expenses that are Deductible Only if You Itemize Deductions on Schedule A (Form 1040)

1 Business expenses not included above (list expense and amount) ▶ personal computer, monitor, disk drive, printer	$5850.00
2 Total. Deduct under Miscellaneous Deductions, Schedule A (Form 1040)	

PART III.—Information About Education Expenses Shown in Part I or Part II

1 Name of educational institution or activity ▶
2 Address ▶
3 Did you need this education to meet the basic requirements for your job? ☐ Yes ☐ No
4 Will this study program qualify you for a new job? ☐ Yes ☐ No
5 If your answer to question 3 or 4 is No, explain (1) why you are getting the education and (2) what the relationship was between



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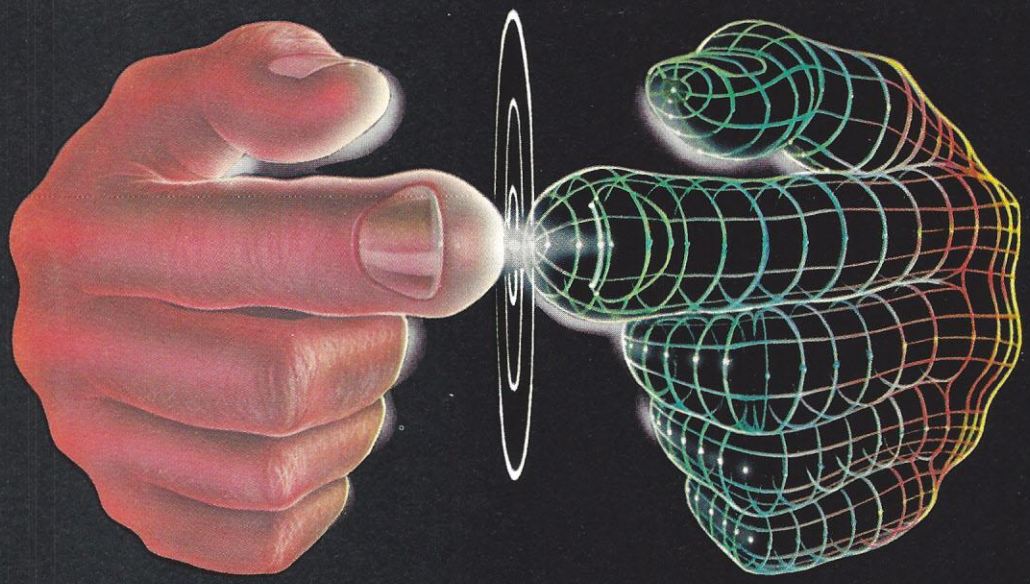

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*Formerly NEC America

CIRCLE 1

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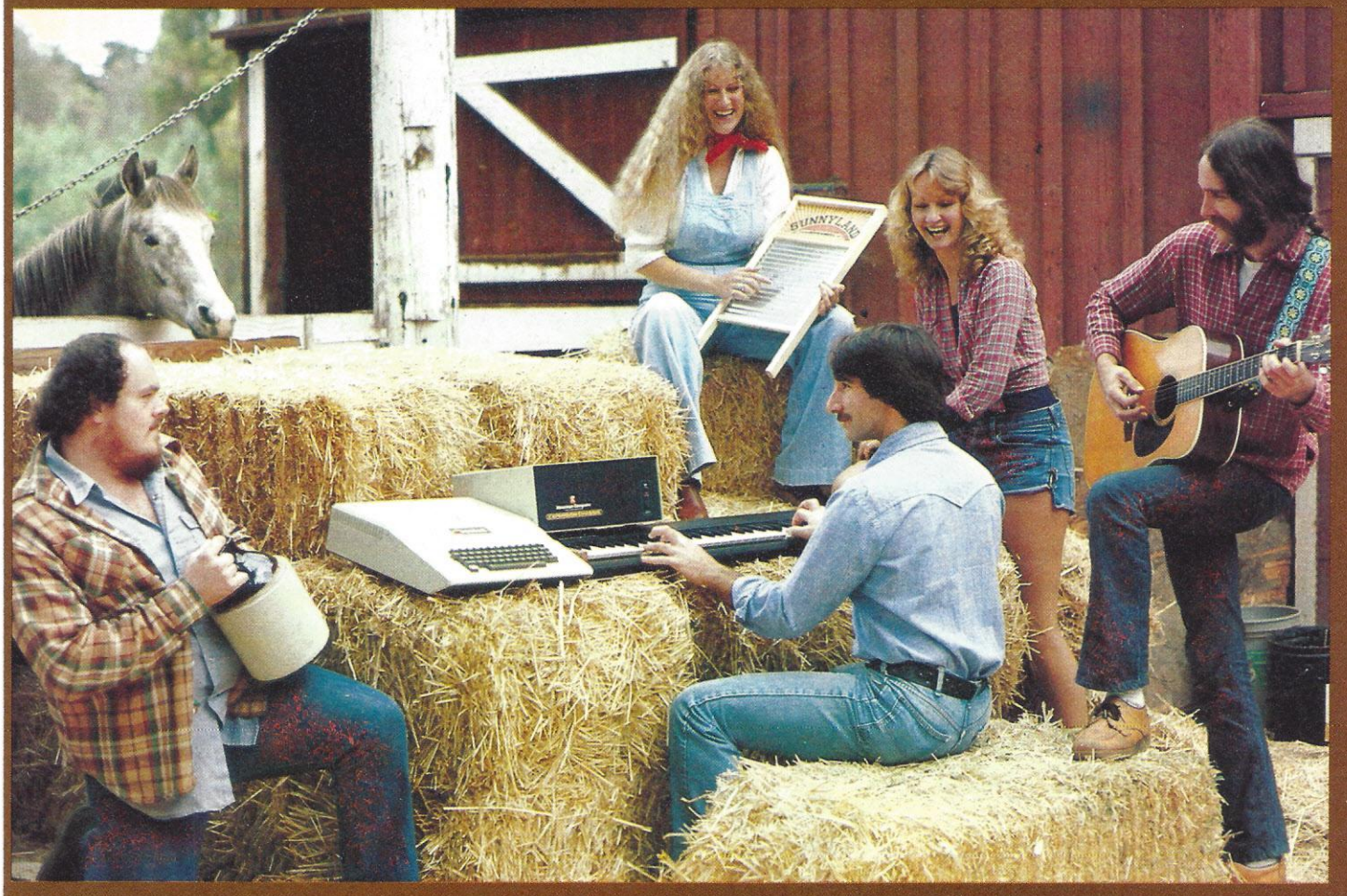

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CIRCLE 2

December 1981
Vol. V No. 12

PERSONAL COMPUTING

DEPARTMENTS

5 EDITORIAL

7 FEEDBACK

11 OUTLOOK

The Future is Now
by Alan Hald and Julie Ross

67 EDUCATION

PRODUCTS

108 Hardware

Peripherals

Boards

117 Software

Business Software

Educational Software

Utility Software

Communications Software

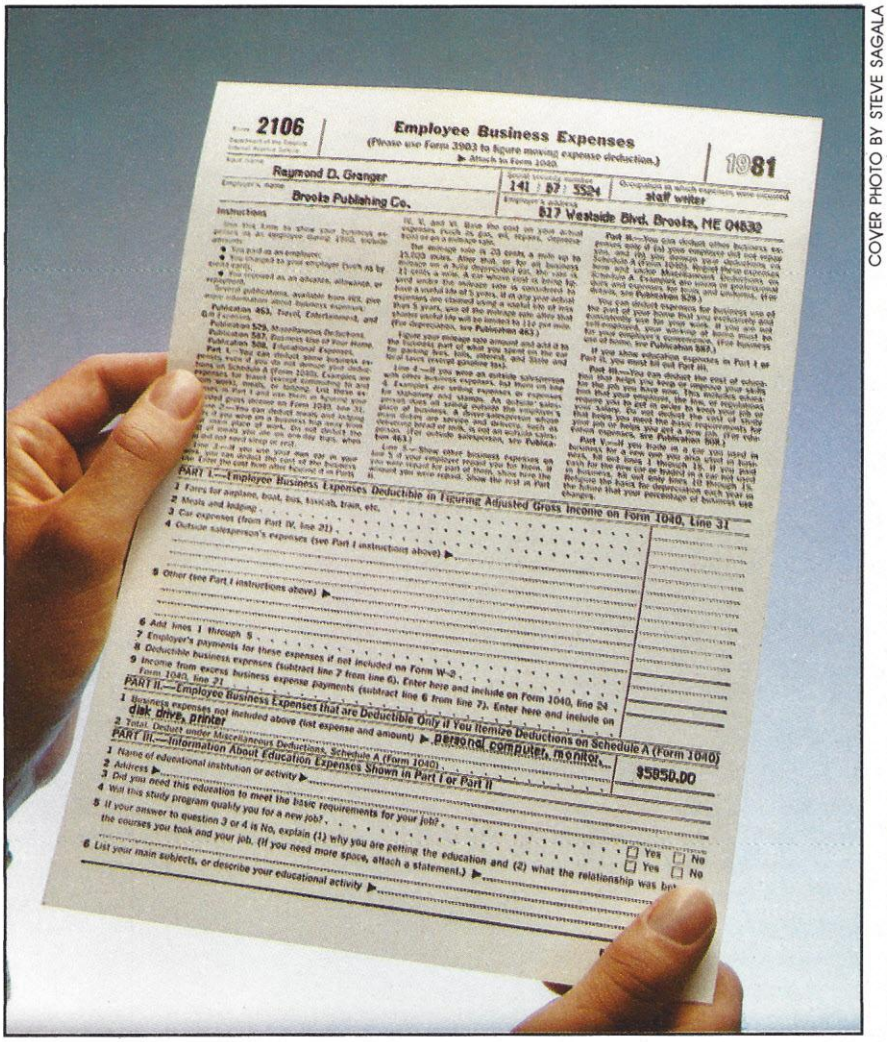
Leisure/Home Software

129 New Literature

146 ADVERTISERS' INDEX

146 PERSONAL COMPUTING DEALERS

153,457 copies of this issue printed

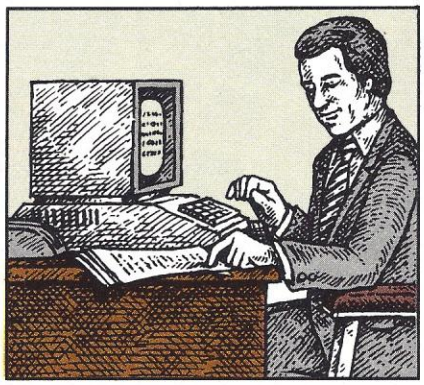


COVER PHOTO BY STEVE SAGALA

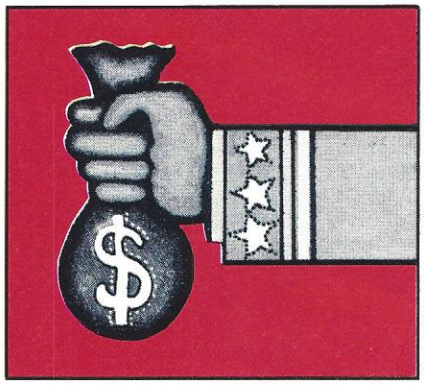
Page 46

BEHIND THE COVER

Soon after the holiday time comes income-tax time. Personal computing can help you through the terror of income-tax tribulations. Under certain conditions, you can even deduct the cost of the computer. See the story on page 46.



Page 26



Page 31

Page 67

FEATURES

26 THE COMPUTER CONNECTION—LOCAL NETWORKS
BY BETSY GILBERT Local networks are changing the way a lot of people do business, with increased productivity as the net result.

31 EASIER ECONOMIC MODELING WITH PERSONAL COMPUTERS
BY KEN McLAMB Forecasting an economic future—by governments or corporations—is being done these days with personal computers. And the results are more accurate, more targeted and more useful than any economic tea leaves we know of.

39 PUT YOURSELF IN CONTROL WITH PERSONAL COMPUTING
BY DAVID GABEL AND LEE THE' Personal computers are speeding up, turning on and clearing up everyday chores in the home and in industry. Read how some future-minded people have gained additional control of their lives through personal computing.

46 GET A HANDLE ON YOUR INCOME TAX
BY ROBERT L. PERRY The income-tax season is rapidly approaching and Uncle Sam's outstretched hand is waving at you. Let your personal computer help you through the ordeal with one of the many tax-software packages presented here.

55 VOICE OF THE IRS: CAN COMPUTERS BE DEDUCTED?
BY E. J. NEIBURGER AND CECILIA WESSNER There are new tax-relief options that help defray your personal-computing expenses. What do you have to do to be eligible for them?

59 ANOTHER COMPUTER ADVANTAGE—CUTTING CHRISTMAS COSTS
BY RICHARD STERN 'Tis the season to be jolly, but who hears "ho, ho, ho" when those gift expenses come rolling in? Find out how one person decreased those costs and increased that merriment.

62 HOLIDAY GIFT-GIVERS' GUIDE
Peer at some of those marvelous low-cost systems, gifts that will thrill all family members and business associates.

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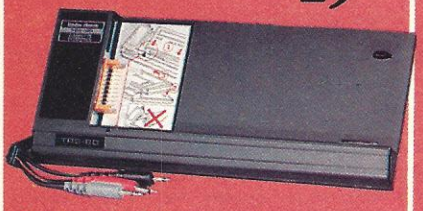

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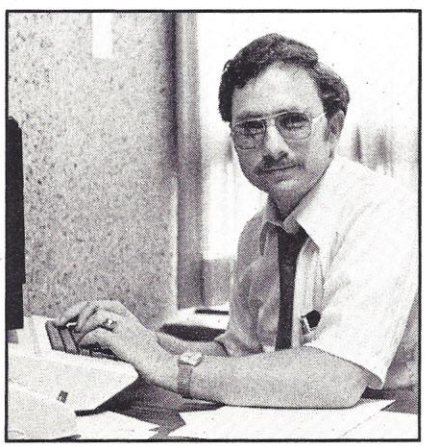
CIRCLE 3

EDITORIAL

'Tis the season



All you readers of *Personal Computing Magazine* have two things in common. You're all human and you're all interested in personal computing—that way of doing things that's changing your lives.

I usually write about personal computing in this space. But the December issue is no ordinary issue, so I thought I'd write about that other characteristic all of us have in common. I thought I'd write about being human.

I guess we all know *A Christmas Carol,* that delightful Dickens story about the holiday season.

Recall that Ebeneezer Scrooge knew that his money business was very important. He also knew that he was going to keep that business and the money it made him, all to himself—no matter the cost to others. As long as he had his business and it was making money, he thought he was happy.

Poor Scrooge.

We know better. We, who have read the story and have seen it played again and again in movies, on stage and on television, know that he wasn't really happy. But it took a great shock for him to see his unhappiness. Once he was aware of his true self, and of the way others thought of him, he changed. He became more human, and became really happy.

We're not like Scrooge, and it's a good thing for us. As we contemplate this holiday season we can look back over the years and be satisfied with our actions in both our business and personal lives.

If we're businessmen, and one of our employees needs time away from his workplace, we allow the time, knowing we'll be repaid by a content employee's desire to do a thorough job. We also never charge an exhorbitant price just because we think we can get the extra money. We know that a fair price brings its own rewards.

If we're professional men, providing advice and service to others for a fee, we always provide that advice and service with the best interest of the client—not our own personal gain—uppermost in our minds.

If we're teachers, we know that the future of the children entrusted to our care for many hours of the day rests ever-so-heavily in our hands. We are always prepared to go that little extra distance to help our students. We do all we can to see that spark of understanding in eyes that want so badly to understand.

If we're computer hobbyists, we know the efforts we put into the pastime we love can provide great benefit for others. We then willingly share our expertise with those who could use it to make their lives better, or more productive, or easier. We know that spreading our knowledge will make things better for all.

If we're parents, we know that we must discipline our children so they will later be able to discipline themselves. Only in this way, we know, will they be able to properly use the fruits of modern technology—like personal computing—to the utmost. But we always discipline with love, never with anger, nor vindictively.

If we're suppliers in the personal-computing industry, we ensure that products we present for sale to users are top quality.

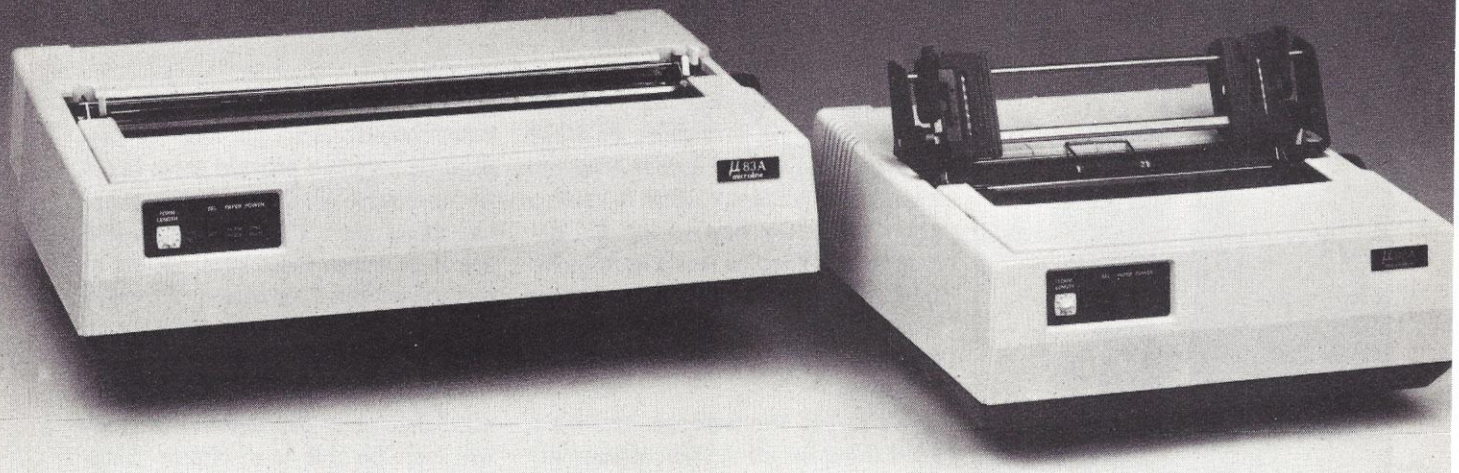
And all of us are happy to share what we have with those who don't have—like the enjoyment of personal-computing benefits. We tell others about our use of personal computing, and we show them how they can use it, too. But we don't cheat others who work in the field by unlawfully copying their product, for example. We pay for what we get, and give of what we have. We know that even though we expect no repayment, it usually comes anyway.

Don't we.

Happy Holidays.

David Gabel

A New Era for Okidata



Models 82A and 83A from ASAP

OKIDATA's new printer line represents a breakthrough in economical, quality printing. These new printers have more options and features than any previous OKIDATA printer. Faster print speed and throughput, full 96-character ASCII, and both Centronics and RS232C interfaces standard, all at an affordable price. Models 82A and 83A are ideal for home or business, personal or educational applications. And now, ASAP is offering these new printers at prices you won't want to miss. Compare the features below. Then call ASAP to order your OKIDATA printer today.

Features	Okidata 82A 80 Column Printer	Okidata 83A 136 Column Printer
Print speed	120 characters per second	120 characters per second
Throughput @80 characters per line	76 lines per minute	47 lines per minute
Print technique	Bidirectional	Bidirectional
Dot matrix	9 x 9	9 x 9
Character set	Full 96-character ASCII	Full 96-character ASCII
Graphics characters	64 block characters	111 dots per inch
Interface Centronics 8-bit parallel	Standard	Standard
RS232C (1200 bps)	Standard	Standard
Size (inches)	14.2W x 12.9D x 5.2H	20.2W x 12.9D x 5.2H
Ribbon	Standard typewriter	Standard typewriter
Power	100, 115, 220, 240 VAC 50 or 60Hz	100, 115, 220, 240 VAC 50 or 60Hz

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CIRCLE 4

PERSONAL COMPUTING

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FEEDBACK

For sale

Dear Editor:

A few years ago our company was involved in a commercial project to install automatic ribbon re-inkers on several hundred personal-computer printers.These compact modification kits are mounted directly inside the printers where they automatically re-ink the ribbon whenever the machine is in operation. The result is consistently crisp, dark print, and ribbon life is extended by a factor of 10 times or more.

We are no longer involved in hardware modification, and we have about 100 of the kits left. The original selling price was $150 per kit, which included installation. The remaining surplus is being made available to interested computer users for $18.25 each, postpaid ($1 extra for air mail). The purchaser must do the installation.

These re-inkers will work on any printer with a standard one-half inch (or narrower) ribbon.

We will be happy to supply these kits for as long as they last.

William D. Johnston
c/o Applied Computing
1808 Pomona Dr.
Las Cruces, NM 88001

Speech products

Dear Editor:

We were dismayed to find that we had been omitted from your survey of voice-system suppliers in the June 1981 issue. We would appreciate your correcting this oversight by telling your readers about Mimic Electronics and its speech-processing products.

The MIMIC Speech Processor—available in several forms—provides both speech input and output capabilities. It is a low-cost alternative with good quality speech at relatively low sampling rates. Applications for our products range from hobbyist experimentation to advanced speech-recognition research to commercial uses. Documentation and demonstration audio tapes are available, as well as complete plug-in systems for various personal computers.

Robert E. Dodge
President
Mimic Electronics

Clearing the confusion

Dear Editor:

I enjoyed reading the article on modems in the September 1981 issue. However, I would like to point out that the features column (in the comparison chart) concerning our Modem I is a little confusing. Upon reading it appears that the Modem I does not use RS-232 interface yet requires an RS-232 cable. This is not quite the case.

The Modem I operates in full duplex using RS-232. If the Modem I is used with a TRS-80 Model I, Level II with 16k, an optional software driver and special cable may be used. These options permit the Modem I to operate through our standard cassette-interface port in a form of modified half duplex—without the necessity of an RS-232 interface.

Thank you for your fine article and we look for many more in issues to come.

Bill Walters
Consumer Information Manager
Radio Shack

Author input

Dear Editor:

The annual Canadian Post Office strike has ended and I've received the July issue, which included my article "Despace."

Although the text of the article included the revisions I made some

time ago, the revised flowchart and program listing didn't make it into print. As a result, line 55184 doesn't handle DATA statements in the manner described in the article. This line should read:

55185 IF PEEK (X–1) = 136 OR PEEK (X–1) = 34 OR PEEK (X–1) = 44 THEN 55190.

Your readers may wonder why the POKEs called for by line 55500 have to be entered manually. In testing the program, I found that the computer would often get "lost" if these POKEs were done as part of the program. In order to recover control I had to press RESET, which sometimes wiped everything out. Doing these POKEs in the command mode eliminated the problem.

I've also found it better to delete the "CLEAR 50" from line 55500 and enter it myself, after doing the POKEs.

Don Wood
Winnipeg, Manitoba, Canada

Receivables and payables

Dear Editor:

I read your September and October 1981 issues. In the September article on receivables, PRODIGY SYSTEMS wasn't mentioned although it does have an accounts-receivable program. In the October article on payables, I would also like to point out some omissions.

In the September article table of features, International Micro had a high of 27 features and Micro Architect had a low of seven. It is with a great deal of pleasure that I point out that PRODIGY SYSTEMS has 21 of the listed features.

The table of reports and journals in the same issue listed 30 features, of which four companies—BPI Systems, Computer Products International, International Micro and Micro Business Software—were tied with 13 features each. At the low end, two companies, Business Enhancement Compuservice and Taranto, had only four features. PRODIGY SYSTEMS had 19.

In the October issue's Accounts Payable Chart of Features, PRODIGY also issues cash basis, on-line processing, one-time vendors, credit/debit memos, finance charges added, multiple bank accounts and trial-payment run.

In the chart of reports, PRODIGY does issue journal/batch proof, bank reconciliation, monthly voucher register, mailing labels and monthly cash summaries.

Thank you for your patience and consideration.

David N. Perkel
Vice President, Sales
PRODIGY SYSTEMS

On the cover

Dear Editor:

We have only been subscribers for the last two months (August and September 1981). We are also the proud and satisfied owners of a Commodore VIC 20 personal computer.

We have searched (in vain) through your first two issues for a single mention of the VIC 20. Imagine our surprise when we revisited the cover of the September issue of *Personal Computing* and discovered two VIC 20s on the front cover. How come the VIC 20 can make the front cover without one word of recognition between the front cover and the back cover for two issues in a row?

Robert W. Tillotson, Jr.
Robert W. Tillotson, Sr.
Grand Island, NY

Editor's note: We goofed on that one. Indeed, the computers on the cover with those delightful children were Commodore VIC 20s. This is but one of the computers that can be used for education. But please note that we aren't in the business of talking about particular pieces of hardware. We talk about personal computing, and that's a different ball game.

Meanwhile, belated thanks to Commodore for the loan of the VIC 20s. The editor who let that one go by has been put before the editorial firing squad.

Receivables interface

Dear Editor:

We were pleased to see North Star Computer's ACCPAC Accounts Receivable System included in the September 1981 review of A/R packages.

We would like to call attention to the fact that our A/R package now interfaces with two of our new software products—ACCPAC Inventory Control and Analysis, and Order Entry and Invoicing.

Thank you for evaluating software products available for the personal-computer user market.

Peter M. Nieber
Manager, Product Marketing
North Star Computers

Editorial comment

Dear Editor:

I enjoyed your September issue editorial. Being an old Arlo Guthrie fan myself, I thought you used him in a unique parable to decipher the personal-computer movement.

Best wishes with the new positioning of *Personal Computing*. We have been looking for the *Harvard Business Review* of personal-computer magazines to emerge—a magazine that addresses the needs of the new personal-computer-using manager.

Fred Gibbons
Software Publishing Corp.
Mountain View, CA

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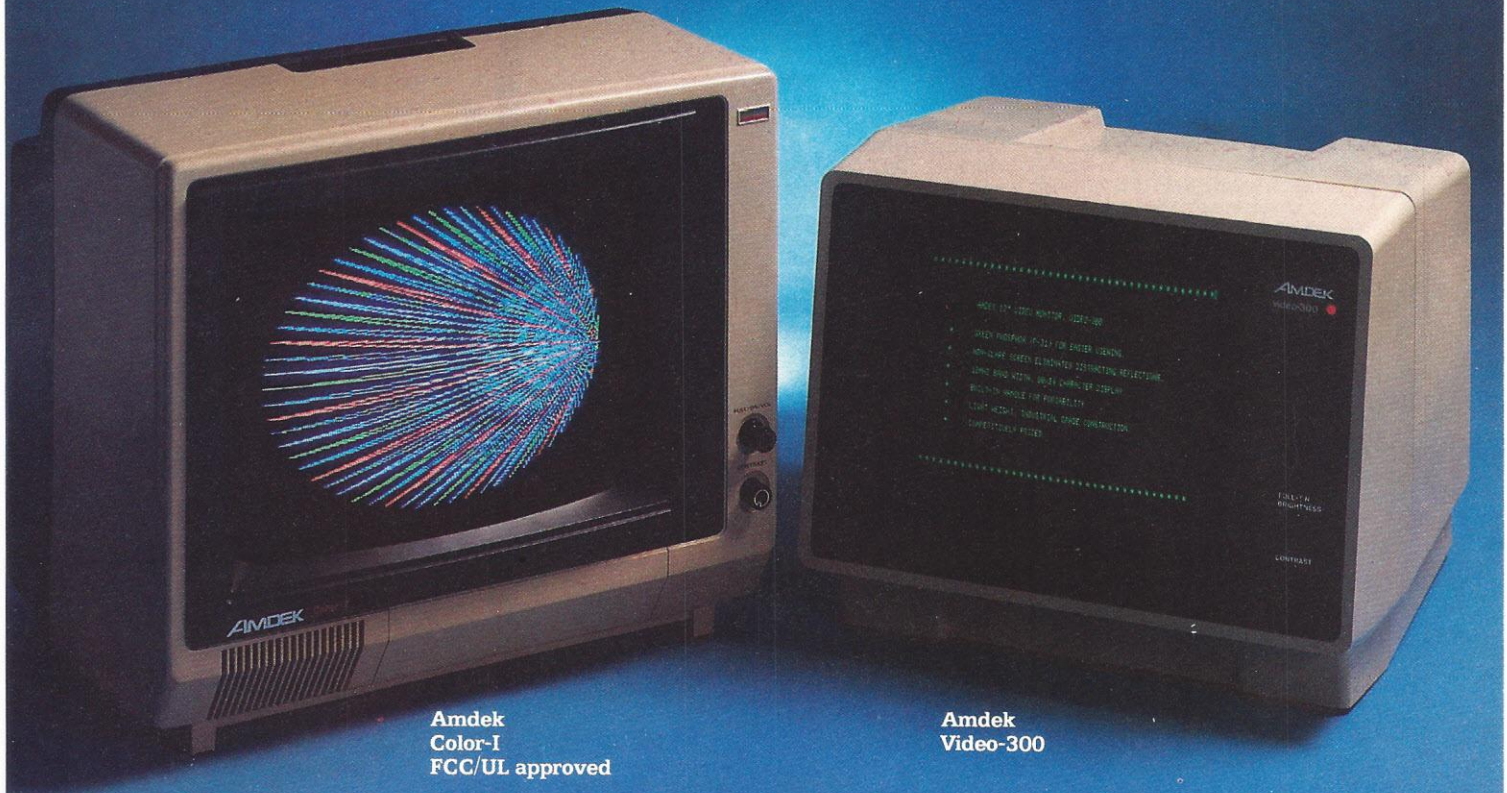

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CIRCLE 6

OUTLOOK

ISC offers money-back guarantee

To introduce more users to color graphics, Intelligent Systems is offering a "no questions asked" money-back guarantee on its 3650 desktop computer, 8001G color-graphics terminal and 8001I color-graphics terminal.

To qualify for the money-back guarantee, a customer must place a cash order for an evaluation unit before December 31, 1981. The unit can be tried, tested, used and examined for 30 days. If the user is not satisfied, the unit and any software purchased can be returned for a full refund.

Intelligent Systems is also encouraging customers to sample its products with price cuts that will be in effect for the duration of the offer. The reductions represent savings from 17 to 23 percent over regular single-piece prices.

More information can be obtained from Intelligent Systems, Intecolor Dr., 225 Technology Park/Atlanta, Norcross, GA 30092; (404) 449-5961.

On-line clearinghouse for information

The Micro Advisor, a source of information and advice on personal computers, is now accessible to users with a terminal or a personal computer through the CompuServe Information network.

Features of the service include a question-answer forum on personal computers, a list of publications including some little-known newsletters, a nationwide list of clubs that meet regularly, a sound-off section for people with gripes they want to air, announcements of new products and reviews of new software.

For more information contact Battery Lane Information Services, P.O. Box 30214, Bethesda, MD 20814.

Call for participation in NECC-82

Authors are invited to submit papers describing actual experiences with computer use in the classroom, or the consequences of such use on the educational process in general. The papers will be presented at the 1982 National Educational Computing Conference (NECC-82) to be held in Kansas City, Mo., June 28–30, 1982.

Papers should report concrete results or be surveys or tutorials which include a synthesis and thorough evaluation. It is expected that most papers will report on specific materials, problems, programs and measures of success or accomplishment.

More information can be obtained from Michael Staman, NECC-82 General Chairman, Campus Computing Services, University of Missouri-Columbia, 305 Jesse Hall, Columbia,MO 65211.

Standing behind IBM

Lifeboat Associates has just announced an operating system it calls SB-86. The company claims it is totally compatible with PC-DOS, the operating system IBM is providing on the IBM Personal Computer.

Tony Gold, president of Lifeboat, has slated this operating system as the new standard for 16-bit personal computers.

Global village in Philadelphia

Everett W. Faircloth

One of the most computerized businesses today is the newspaper business, as almost all metropolitan and medium sized papers (50,000 circ.) have switched over from typewriters to electronic word processors. Gone is the almost soothing sound of a room full of typists pounding out tomorrow's headlines.

The "global electronic village" that Marshall McLuhan, a famous media critic, talked about more than a decade ago, is found in newsrooms across the nation where the manual typewriter once reigned supreme. McLuhan felt that one of the results of all the technological advancements being made in electronics would be instantaneous communication between any two points on the globe. Hence, this new electronic interdependence would recreate the world in the image of a global village.

Of course, one of the future's most potential users of personal computers is the newspaper writer.

As most writers on newspaper staffs now presently own typewriters, in the near future it will be to their advantage to have word processors of their own. Presently, the cost is out of range of many potential buyers to obtain dedicated word processors.

However, one professional in this field, Margo E. Downing-Faircloth, a reporter for the *Philadelphia Bulletin,* has found that with the relatively low cost of personal computers, the ability to do serious text editing is increased.

Faircloth has found that the money spent on a personal computer—which has the capability to do serious word processing, and other related items such as the ability to work remotely from home and connect to information utilities using telephone lines—is a bargain. This is particularly true when the same personal computer plays arcade games, keeps financial records and plays music. So the money spent is spread out over several different functions.

Aside from the convenience of having her own word processor programmed into her personal computer, Faircloth can also take advantage of some tax breaks to offset some of her expenses.

According to her tax accountant, Jim Weikart of the New York based firm of Weikart Tax Associates, a person owning a personal computer can get a 10 percent investment credit and depreciation for up to five years.

For example, if the system cost about $3500, a $350 tax credit would be allowed right off the top. In addition, Weikart says you can depreciate the equipment by at least 15 percent the first year, and continue depreciating it for five years. So, in a sense, the government will subsidize your system.

Faircloth is apparently not the only person using the tax-credit laws to her advantage. Weikart says that in the past year, he has seen significantly more requests for tax write-offs on computer equipment.

Faircloth's system consists of an Apple II Plus personal computer and an Apple II disk drive. She uses a Leedex 12-inch black and white monitor, an Epson MX-80 printer, a D.C. Hayes modem to complete it, along with Applewriter software—a kind of screen-oriented editor which resembles the one used by her employer.

While developing her system, Faircloth came up against a major obstacle. She couldn't find a terminal program to drive the D.C. Hayes modem and be compatible with the Applewriter program. Finally,

Although the familiar clacking of typewriters is disappearing from the country's newsrooms, reporters are finding that personal computers help them get those late-breaking stories in on time.

her husband wrote her a custom machine-language program to link the two.

Now she can write a story at home in Berlin, N.J., and transmit it by phone to the *Bulletin's* mainframe (an IBM 370) in Philadelphia. The same story can then be retrieved by phone for final editing and approval in the *Bulletin's* bureau office in Cherry Hill, N.J.

"I think it's a great idea," says Faircloth's Assign-

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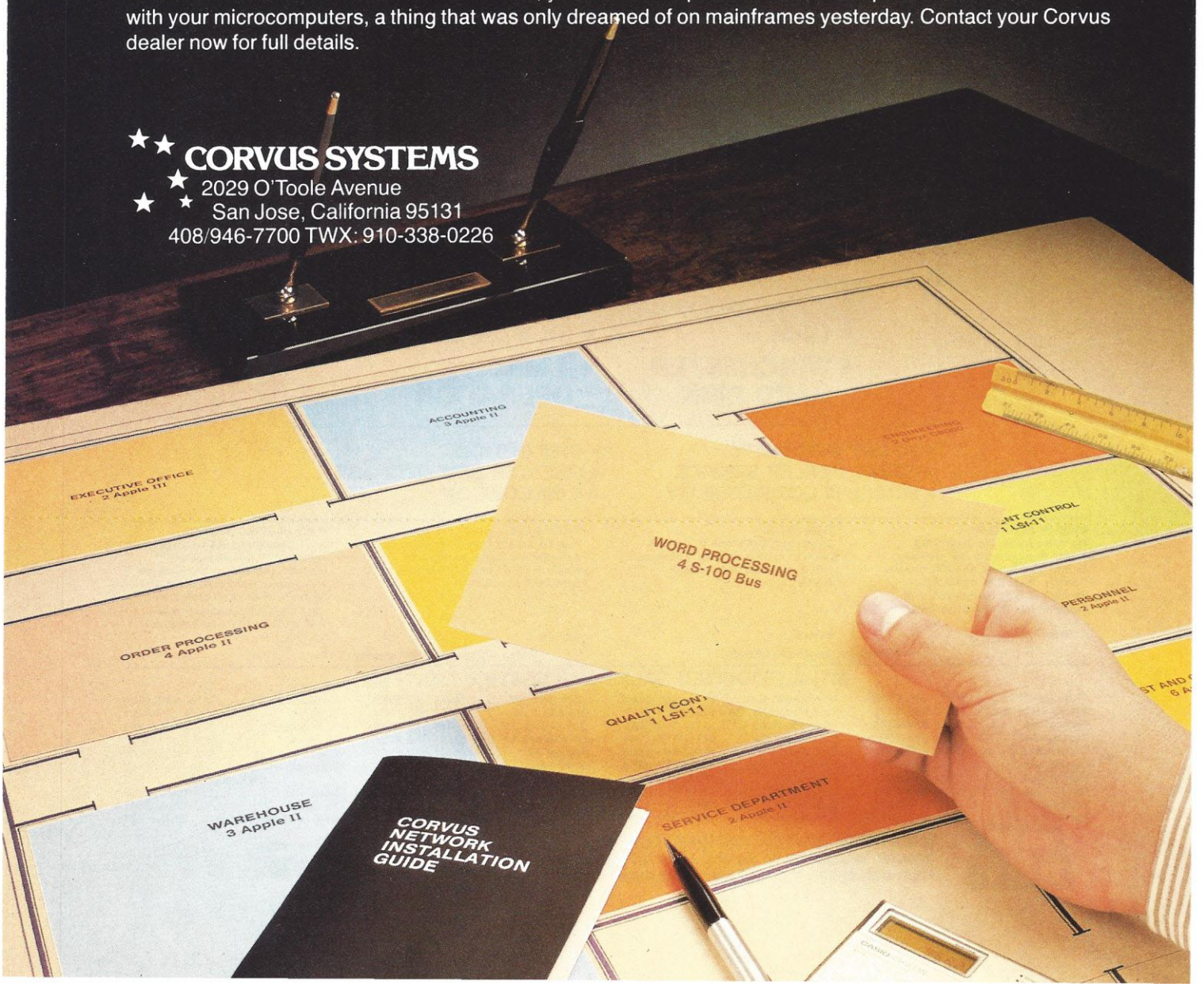


ment Editor, Joe Happ. "It's a terrific concept. There are so many possibilities. For instance, I could call Margo to do something near her home and have the story in quickly because she wouldn't have to drive in to the office. That would be particularly effective when on deadline."

But there are other possibilities, Happ says, because what you're actually talking about are remote text-editing terminals not only in homes, but in small bureau offices in remote places.

The Bulletin uses telerams in some of its bureau offices. Telerams are word-processing terminals made by Hewlett-Packard, which have the ability to both transmit and receive text over existing phone lines.

"With this ability, I can send background information concerning a possible story to Trenton, for example," Happ says, from the wires or just from notes.

Happ states that information can also be sent in from the bureaus on breaking stories—stories that require information from different parts of the New Jersey region to the main office in Cherry Hill where it can all be compiled and written into one regional story.

Before Faircloth's stories could be accepted by the *Bulletin's* mainframe, she had to obtain proper security clearance. This essentially amounted to a password and a complicated key sequence used in front of all stories. *The Bulletin* wouldn't want some stray writer from the *Philadelphia Inquirer* calling in.

Computers in sales

The briefcase and flip chart—the salesman's repertoire of tools—may, over the next decade, become another casualty of the computer age. According to a report by American Business Press, an imaginative approach to selling ad-space has been developed by Robert K. Singer, district sales manager of McGraw-Hill's Electrical Construction and Maintenance and Electrical Wholesaling. With the help of an Apple computer, this approach is already beginning to pay off.

Singer is using the machine mostly for territory management and gaining time over his competition. Singer's entire customer file is in chronological order on the data bank, and each day the computer reports on which customers should soon be called. When Singer chooses the customers he intends to see, he can quickly find their complete files. And since every piece of new information on an account is entered as soon as it is received, files are always completely up-to-date.

Singer and a McGraw-Hill cohort, Steve Donahue, who is also using a personal computer to augment his sales, describe the Apple as "a typewriter that never forgets." They point out that the convenience of inputting information once and then only updating and correcting when necessary relieves the salesmen of a lot of unnecessary work.

Further on in time, Singer hopes to use the computer in presentations to potential customers. Having made a few test runs where the Apple was used like a slide projector—and having increased his sales because of these presentations—Singer is making plans to bring the computer to his clients' offices more often.

There are drawbacks in this approach, however. "There are a lot of people who are used to viewing the computer as an adversary, like the machine at the bank that tells them they're overdrawn by mistake, or the one you can't argue with when mistakes appear on the credit-card bill." But in the end Singer feels that as customers get used to seeing the computer as part of a salesman's traveling show, any initial client rejection of the machine will rapidly disappear.

Radio Shack hooking up to networks

"In the decade of the eighties," says John Roach, president and CEO of Tandy Corporation, "networking of computers will become commonplace." Thus, the corporation has joined with Datapoint in announcing ARCNET for the TRS-80 Model II computer. It gives the user, "a very big computer resource from very small computers," says Roach.

For some time, local networks have been an area of serious work for a number of manufacturers. The advantage of the networks is that smaller computers can be used to access shared resources for substantially less money than those resources cost. The shared resources need only be purchased once, and then can be distributed to many users through the local network.

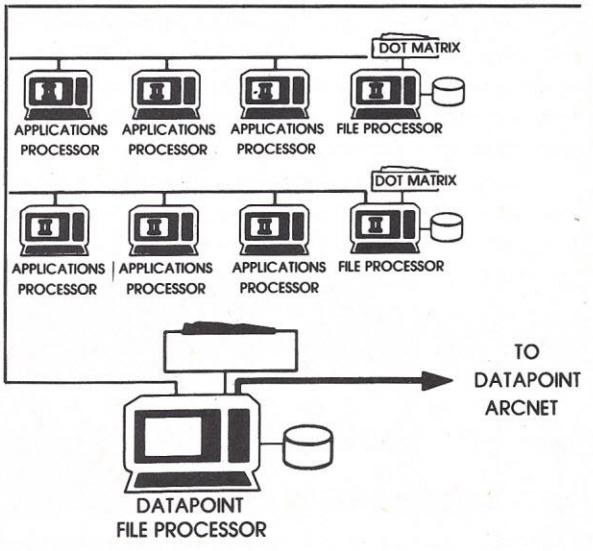
Other local networks include the Ethernet from Xerox (also sponsored by Intel, a semiconductor manufacturer, and Digital Equipment Corp., a minicomputer builder) and Z-Net from Zilog, an Exxon company. Also, Nestar Systems makes a

controller that will network Apple computers.

Radio Shack is jumping into the field in a slightly different manner, however. It will use the local-network component of Datapoint's Attached Resource Computer, ARCNET, to provide the high-speed, low-cost local network for the Model II.

Tandy will use the ARCNET protocols and software, and a new large-scale integrated-circuit interface component from Datapoint to provide the network, which can operate at 2½ million bytes per second. Using these devices and protocols, users can connect as many as 255 computers to a local network, along with their peripherals.

And ARCNET will also be able to contain Datapoint processors or peripherals, like the company's 137-Mbyte disk, or 900 line-per-minute printer. The processors could be used to hook a local



network of Model IIs into a Datapoint network, or, using Radio Shack's recently announced bi-synchronous communications software, they can be connected to certain IBM or DEC communications systems.

"Obviously," comments Roach, "the size and power of the TRS-80 system has taken a quantum leap forward, and Datapoint users have new flexibility in system configuration."

Users who already have Model II computers need to purchase an interface card that plugs into existing card slots in the rear of the computer. The card will be built by Texas Peripherals, a joint venture of the two companies that already supplies each with disk drives. The card will sell for about $400. The user must also acquire a co-axial cable, sold by the foot, and a junction box. A passive junction box, that can handle up to four computers, sells for about $200. An active box (one that includes signal amplification) that can connect more computers, will sell for about $2000.

For more information: Radio Shack, One Tandy Center, Ft. Worth, TX 76102; (817) 390-3700.

Computers in hydrology

When Linsley-Kraeger Associates purchased its first personal-computer system, the company intended it to be used for some engineering programs that didn't require much memory. The system was also intended for some text processing.

This consulting firm, specializing in hydrology, hydraulics, and water-resources planning and management, soon found that its Cromemco System Two computer had capabilities that far exceeded company expectations. With the discovery of these advanced capabilities, the firm decided to start running more lengthy simulation models.

When running these simulations, the company discovered a major limitation of the system. It didn't have adequate storage space for the large amount of data they required. To solve the storage problem, the company acquired a second Cromemco personal computer, the Z-2H Hard Disk Computer system. This system included 11 megabytes of storage on a Winchester hard disk, and was configured with Cromemco's CROMIX operating system.

Dr. Brook Kraeger, one of the founders of the company, proceeded to write a number of programs in Cromemco BASIC which allowed him to perform a variety of analyses on hydrological data. For example, one program performs multiple-regression analyses on time-series data, including monthly rainfall and streamflow data for a period of 60 years.

The type of information these programs provide is used in a variety of ways, such as determining how large a spillway to design when building a dam or to determine at what height to place a bridge above a riverbed. The results of the statistical analyses run with these programs have already been incorporated in a number of completed reservoir and water-resources studies.

With the CROMIX operating system, the nine-track tape drive, and some additional hardware that

continued on page 98

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CIRCLE 7

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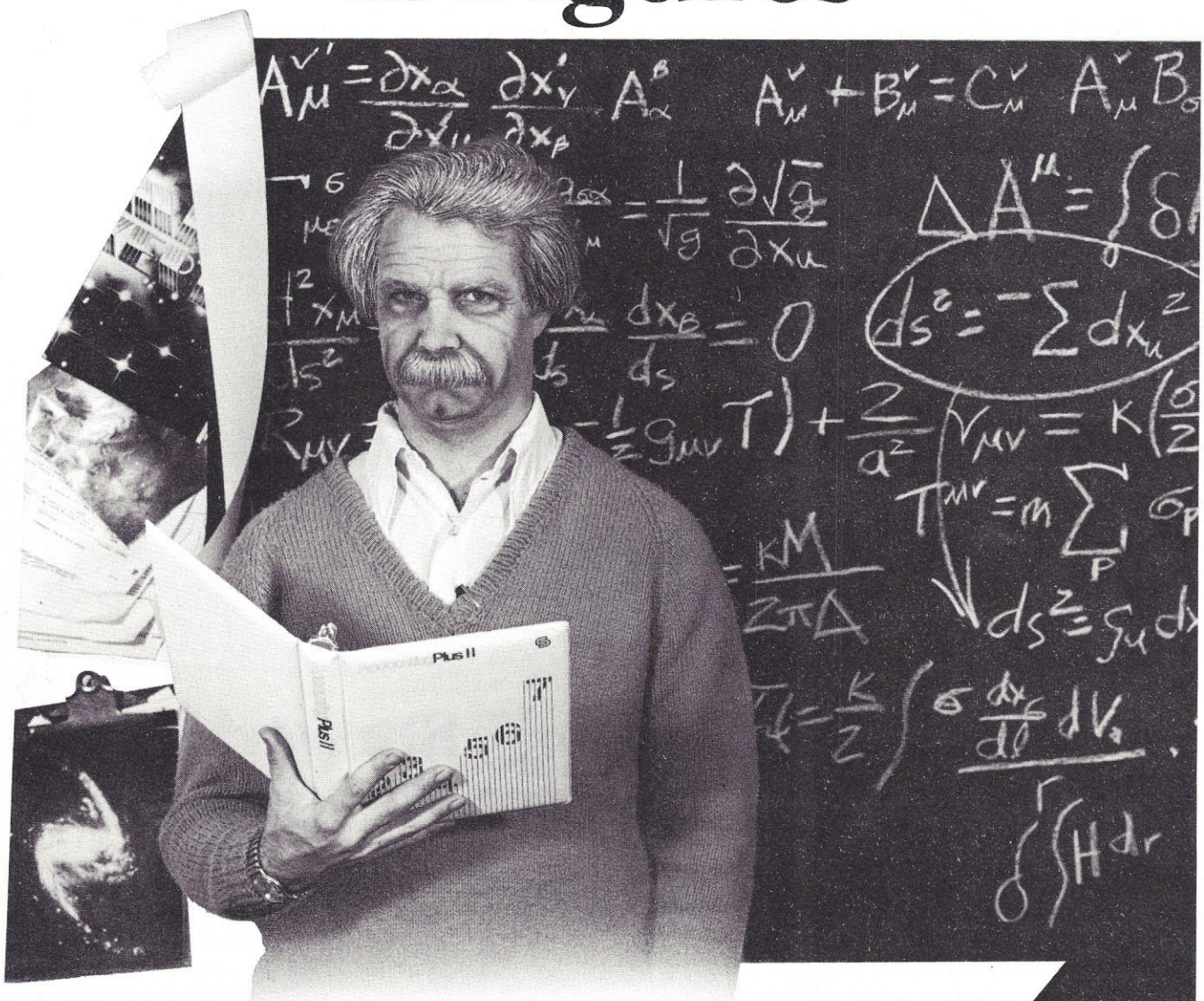

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Alan Hald and Julie Ross

The future is now

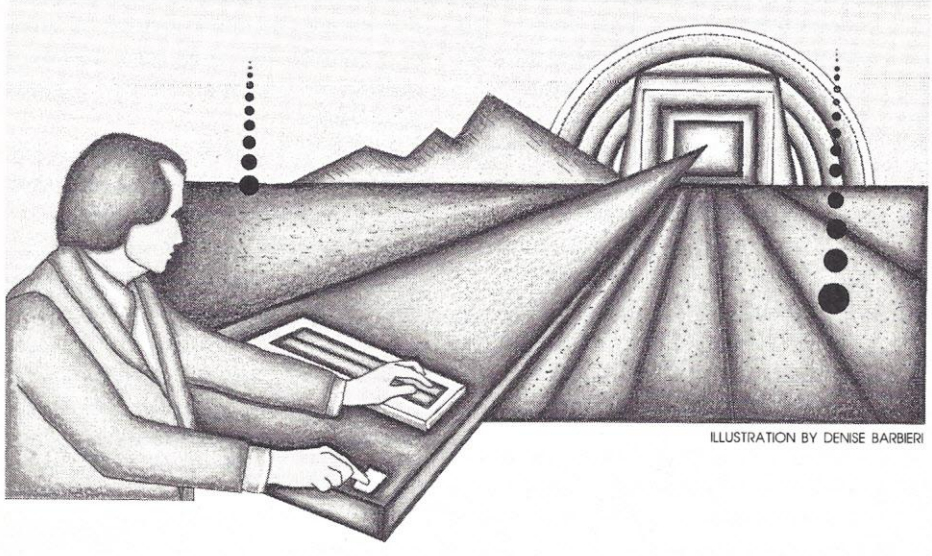


ILLUSTRATION BY DENISE BARBIERI

Editor's note: Technology has moved out of the realm of science fiction and into the mainstream of everyday life. In the almost forseeable future, electronics will be pushing us to expand our minds even further, thereby eliminating some more down home, old-fashioned prejudices. We must accept home information services, computerized homes and talking machines as the way of tomorrow's world, and even the redefinition of our work and family life. The future, Orwell-style, is now.

It has now been a full decade since Intel introduced the first microprocessing chip, whose insignificant size belied the tremendous influence it was to have in the years to follow. In the early 70s, the personal computer held fascination for a very limited, specialized group of people—the hobbyists.

In the 80s, we are beginning to see a convergence in the fields of microprocessing and telecommunications, heralding in a new era of advanced human capabilities, which are rapidly becoming accessible to an ever-growing segment of society. Laser and satellite technologies are advancing to the foreground of mass-communications techniques, creating an infant industry comparable to the microelectronics industry of five years ago.

This year's most recent computer shows, notably the National Computer Conference and the Consumer Electronics Show, held the spotlight for amazing new products, including machines that we can actually communicate with directly on a verbal level, through ordinary speech. This major breakthrough, led by such products as the Scott Instruments Vet-2 Voice-Entry Terminal and the Vodex speech synthesizer, "Type-'N-Talk," is bringing to computers a more sophisticated capability in dealing with their human counterparts.

With the Scott system, spoken dictation is automatically input to the computer. There is no need to type in text or data. Conversely, with Type-'N-Talk by Vodex (a Votrax company), the user simply types a word or phrase on a keyboard, and the machine speaks it aloud.

With ingenious products like these, we will begin to see home computers that are more human-oriented and more personable. With a little imagination, we can begin to create entirely new environments from these machines, wherein the primary emphasis is on interaction between the animate and the inanimate. We will be able to develop a conversational approach to home management, participating in the natural development of new forms of communication such as man to appliance, home to appliance, home to home and perhaps even appliance to manufacturer.

It is conceivable that within a matter of years the latter case could even become federal law. It could be

ruled that any defective appliance must turn itself back in to the manufacturer via a toll-free line, or report immediately to its owner when a problem arises. Preventive maintenance of electrical appliances takes on a whole new meaning when those appliances are made to speak, and to understand speech.

While it is easy to see the practicality of machines that can help take care of themselves, especially when it comes to automobiles, the situation could also lull us into a false sense of security should we begin to believe these machines and appliances possess the power of judgment. No matter how far our technical anthropomorphism stretches, we must realize that there are still countless functions exclusive to the human race.

House of the future

Many people are already aware of the benefits of computerization in the home in the areas of energy conservation and home security. One such computerized home is the Ahwatukee House of the Future, developed by the Motorola Semiconductor Group in a housing development near Phoenix, Ariz.

The house's system consists of a network of five personal computers, several closed-circuit television cameras and monitors, and various sensors that detect levels of temperature, humidity and motion.

For heating and cooling, the house is equipped with solar collectors, an evaporative cooler and central air conditioning, each automatically controlled according to input from the temperature/humidity sensors. Outside temperature is also monitored. The system then knows when it is most energy-efficient to automatically open or close the appropriate windows rather than activate an energy-consuming device. Optimal indoor temperature may then be maintained at the lowest cost.

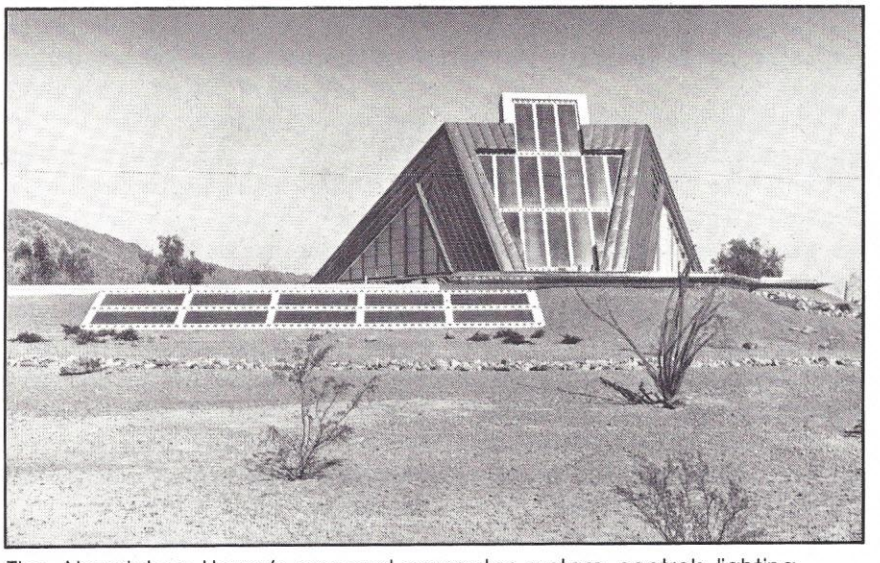
The computer may also be programmed to turn various appliances and lights on and off at predetermined times. This derives maximum benefit for energy expenditures, using the concept of "load-shedding."

Security measures provided by the House of the Future include protection against fires and burglars through the use of smoke and motion detectors. The Ahwatukee home seems almost conscious at times. Upon punching in the correct access code on a numeric pad to gain entrance to the house, the computer can be programmed to greet family members by name.

Home developers of the future may well have an entirely new selling point on their hands. Aside from playing up the more obvious features of a house, they may have to begin selling on the basis of the home's personality.

Although there are currently several personalized homes scattered across the nation, they all have a major drawback: cost. Computer technology is sufficiently advanced to handle personalized home features, but there is no standardization among appliance manufacturers to allow easy and inexpensive hook-up to a central home-computer system. Until this standardization is established, the cost will remain too high for the average consumer.

This concept of the "intelligent home" is frightening to many, and the thought of speaking machines is appalling. Why, then, are people purchasing more and more personal-computer systems, whether for use in the home or in business? The reasons are the same as for almost any purchase—the utility that may be gained from the product.



The Ahwatukee House's personal-computer system controls lighting, heating and security.

Education too

In the past, non-threatening electronic entertainment was the primary utility derived from home computers. People enjoyed playing PONG when it was first released by Atari, and today, schoolchildren and adults alike are hooked on more complex computer games like "Dungeons and Dragons." More extensive applications for home computers were then perceived as acceptable, since consumers had been "warmed up" to the idea of computers through relaxing game-playing.

In addition to buying computer

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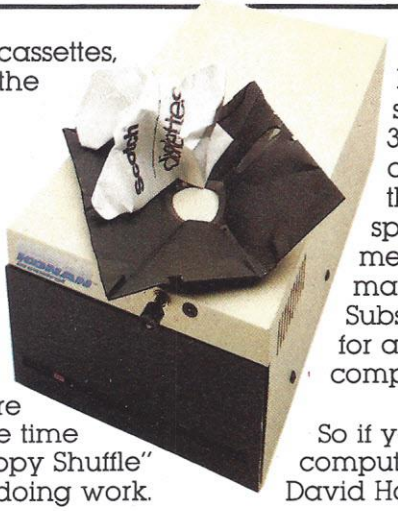

Compared to cassettes, floppies were the greatest thing since integrated chip. But with increased applications, data bases, and speed requirements, a lot of business people are spending more time doing the "Floppy Shuffle" and less time doing work.

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CIRCLE 69

games, parents began buying home computers to aid in their children's education. These new computers are a welcome relief from television. They allow children to have fun while learning, and also help improve eye-motor coordination in the process.

Although a computer is not the best form of teacher, or even a suitable substitute for a teacher, it can certainly be an acceptable tutor for improving basic skills. Unfortunately, there is still a shortage of educational software available for home use. When this problem is remedied, and coupled with a nationwide computer-augmented communications network, we may well have a whole new "genius generation" on our hands who have instant access to an unlimited playground of knowledge. The ensuing generation gap between these "on-line" children and their parents will be unprecedented in human history.

Accessing information

The value of the home computer in the future to the typical person will be this tremendous access to information, available through an intricate, intelligent networking system. The benefit of computer-augmented networking over our current telephone system will be that the intelligence will lie at the user's end, rather than with the central switching station. The user's needs will then take precedence over the system's needs.

For example, messages can be left in the system to be read or acted upon hours or days later, the speed and volume of information transmission increases enormously, and the network can be searched and scanned to pick up items of interest 24 hours a day. Individuals with specialized interests, whether they lie in neurosurgery or in following soap operas, will be able to communicate through their home-computer systems with others who share their interests.

Using this network, a person with the initial concept for a new invention could implement an around-the-clock scan search to locate and contact a person across the country who has the ability to further develop the concept into a reality. These two people could then use the same method to quickly get in touch with a third party who has the necessary funding to actually get the project off the ground.

This type of high-speed, two-way communication will ultimately result in a virtual explosion of innovative ideas, ready to be translated into new products and services.

For the past fifty years, we have been faced with the services of the broadcast media, which essentially offers one-way communication. The public has had little choice as to the information they received. Our new society will be based on two-way communication, with new forms of entertainment and information-gathering focused on interaction.

There are a few such network-based information systems available, including the Source and MicroNET. They allow hook-up between home computer terminals and a prime, or host computer, via the phone lines.

These services provide access to travel information, discount shopping, UPI and AP newswires, developing industry trends, stock-market reports and a plethora of other types of information—even how to select the correct wine for a special dinner. The Source and MicroNET also allow instant messages to be sent to friends, business associates or clients. Even though these systems may appear advanced, they are primtive in terms of what can be achieved.

What then, is holding us back? The telephone system in the U.S. is one of the largest, most complicated networks ever built. Even with this complicated machinery, the telephone is slow and expensive. It is inadequate for the transmission of a high volume of data, and poor for large-scale conferencing. What is needed is a form of computer-augmented communication, coupled with satellite technology, to provide high-speed, two-way communication at low cost.

Cable television and video tape recorders are other communication devices that provide us with an insight to the future. We have seen that the consumer will pay a fee for a specialized service, such as first-run movies. The extrapolation is that if people will pay extra for this service, they will also be willing to pay a fee for each additional premium service they receive.

We can now begin to see the potential value of today's cable companies. The value of the cable is proportional to the perceived value of the service provided. The use of optical fibers or light cables could replace the coaxial cables used today, offering the benefits of significantly increased speed and volume of transmission at a decreased cost.

Electronic watchdogs

Numerous experiments are currently being conducted nationwide and abroad with videotex, which, it is predicted, will link eight million U.S. homes with computer data banks by 1990. Warner Amex Cable Communications, American Telephone and Telegraph, Times Mirror Co. and CBS are but a few of the industry giants who have already invested millions of dollars towards developing this new phenomenon. The biggest selling point of videotex link-ups promises to be the concept of banking at home through the use of electronic fund transfers.

Instilled within our society is a basic mistrust of banking institutions. With videotex service from home, users could check their daily balances if they so desired, using the computer as a kind of "electronic watchdog" over their money. This summer, Citi-

continued on page 89

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CIRCLE 12

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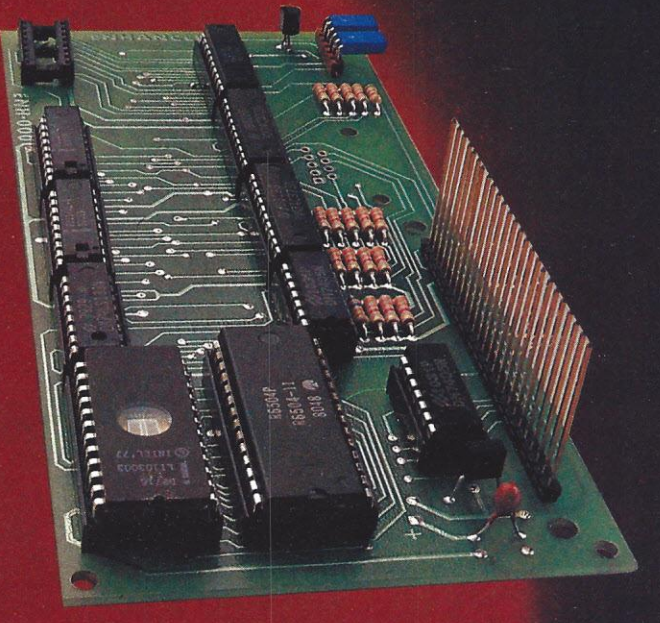
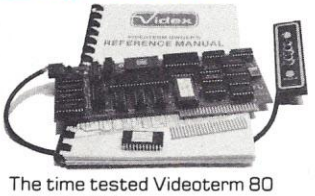
Suggested retail price: $149.00.



■ VIDEOTERM



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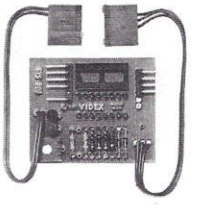
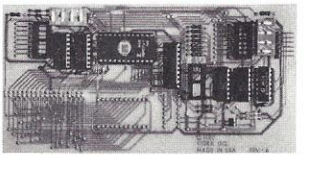


The Soft Video Switch is an automatic version of the popular Switchplate. It knows whether it should display 40 or 80 columns or Apple graphics. It does the tedious work of switching video-out signals so you don't have to. The Soft Video Switch can be controlled by software. Any Videoterm with Firmware 2.0 or greater may be used with the Soft Video Switch. The single wire shift mod is also supported. Package price is $35.00.

■ KEYBOARD AND DISPLAY ENHANCER



The original Keyboard and Display Enhancer is still available for Revision 0-6 Apples (on which the new Enhancer II will not fit). These Apples have memory select sockets at chip locations D1, E1 & F1. The Keyboard and Display Enhancer allows entry and display of upper & lower case letters with fully functional shift keys. It does NOT have user definable keys nor a type ahead buffer. The price is $129.00.

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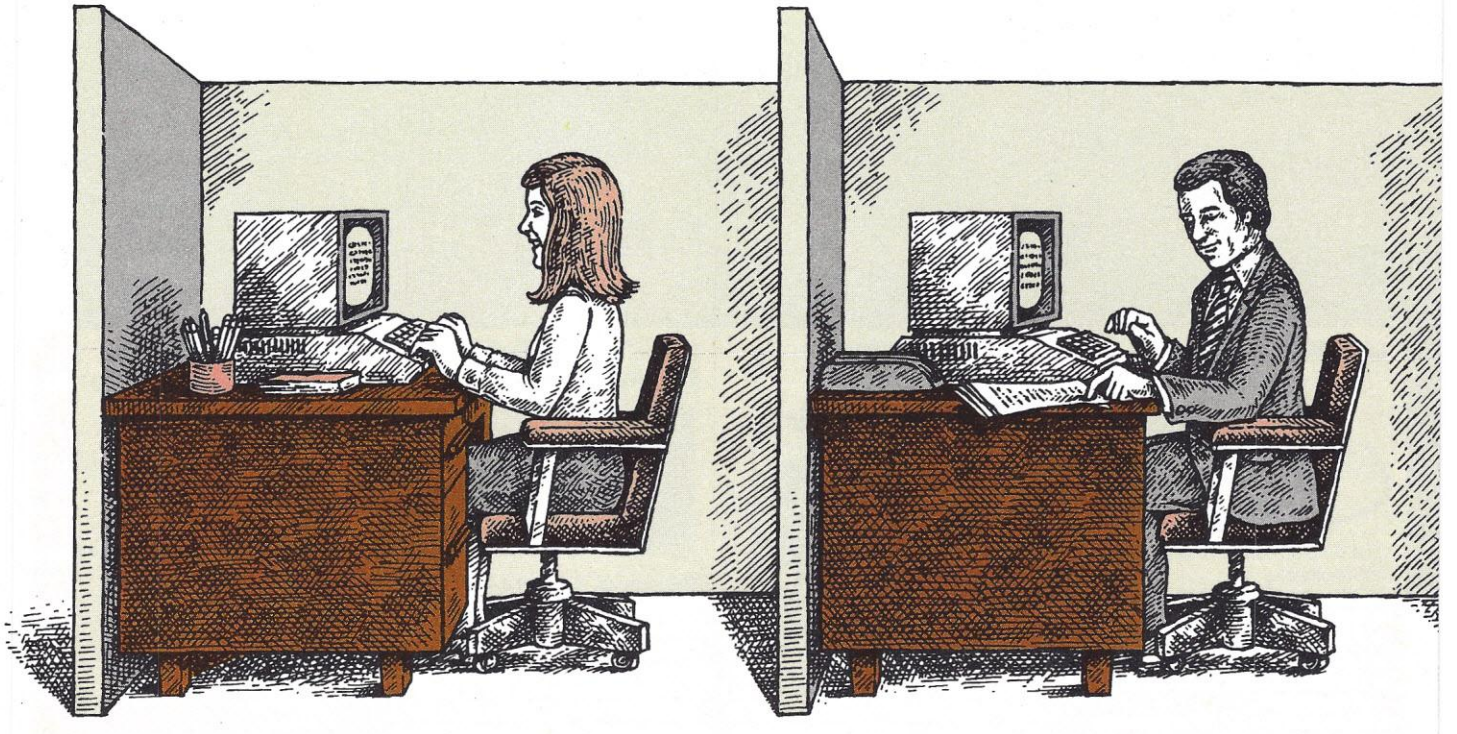
The computer connection—local networks

Networks don't necessarily mean ABC, NBC or CBS. Local computer networks provide quick access to information and increased storage capacity, and you can forget the antenna

Five years ago, if you were talking about networks, chances are you were discussing either ABC, CBS or NBC.

Times have changed. Today, networks play a major role in the daily schedules of doctors, lawyers, educators, architects, bankers and other professionals, and they don't have anything to do with television. What they *do* concern is computers, and these networks are changing the way a lot of professionals do business.

So just what is a computer network? Webster defines network as "an interconnected or interrelated chain, group or system," which is as good a definition as any. If you take



that description and apply it to personal computers, what you come up with is a process that allows users to pool the capabilities of a number of individual computers into one powerful system.

Local networking should not be confused with the traditional time-sharing method of accessing computer power. In time-sharing, many people are tied to a kind of network, but each user is limited to only one bank of stored information that is located in a large computer and accessed via telephone lines.

The key word here is "one." Since all users share a single computer, each person must take his turn to access the needed information. If a user happens to require a piece of information in a hurry, he's out of luck because he can't plug into the computer until it's his turn.

Local networking gives each user his own computer to work with, providing him access to the information he needs anytime he needs it. It also connects all the users on the network, so that each person can communicate directly with other users whenever necessary. Finally, local networking provides for sharing of expensive peripheral equipment, such as high-speed printers and large-capacity mass-storage devices.

The introduction of the personal computer makes it possible for professionals to enjoy the benefits of computerization at a price they can afford. Local networking takes all of those benefits and magnifies them.

A limitless market

The market for local networking seems boundless. Virtually anyone in an office environment, doing a relatively high volume of business, stands to benefit from an in-house computer network. One has only to note the number of companies getting into the networking market to see how popular the technology has become. From computer industry giants to small start-up operations, everyone seems to be touting networks these days.

Three California firms founded within the past four years have man-

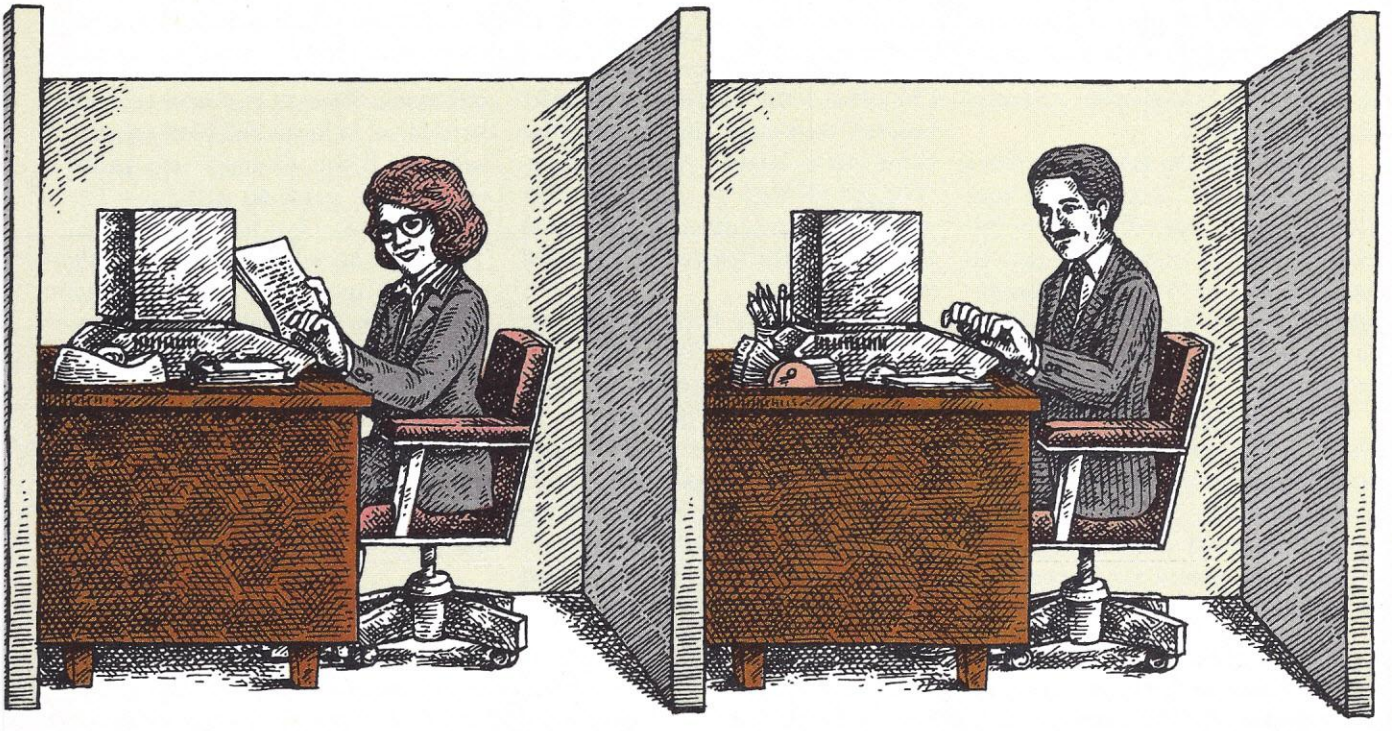


ILLUSTRATION BY LARRY ROSS

aged to accumulate a lion's share of the attention being focused on local networking. Nestar Systems of Palo Alto, Corvus Systems of San Jose and Micromation of San Francisco offer unique networking techniques that provide the user maximum performance for the dollar spent.

Nestar's Cluster/One Model A system provides the connection of up to 65 Apple II computers to a single network. The individual computers are joined via the Nestar Network Interface Card and multiwire cabling, for distances up to 1000 feet. Hooking up additional users is simply a matter of inserting an interface card into the Apple and attaching the necessary cables.

Users on the Cluster/One network get all the benefits of an Apple and a whole lot more. They can communicate directly with one another through their computers. They have access to many times the information-storage capacity available on an Apple II. Users also have access to one or more printers located within the network. After weighing these benefits, a businessman needs to know if his firm should computerize with networks.

A small business staffed by three or four employees is not a likely candidate for a Cluster/One system. But for a firm with a lot of employees who need quick access to a lot of information, the system is an ideal solution to the sticky problem of information management.

For example, Public Optical of Ontario, Canada, was drowning in a sea of paperwork a year ago. Before going down for the third time, it turned to local networking from Nestar, and solved its information problems in a few short weeks.

"We woke up one day to the fact that our business had outgrown the old-fashioned way we had been running it," says Herb Abrams who owns and operates the company with his brother Frank. "We had a booming operation and we were trying to run it like a corner store."

Founded in 1949 by Abrams' father and uncle, Public Optical today is a major dispenser of eyeglasses in the Southern Ontario, Canada, area. The firm employs about 80 people in five locations, and each branch operates as a complete retail outlet and factory.

"We sell hundreds of pairs of glasses every day, which is great for business but a real nightmare in terms of keeping up with customer records," Abrams says.

To the rescue

After handling all the growing customer files manually for years, the Abrams brothers finally threw up their hands and admitted that they needed to computerize the operation. After a few weeks spent researching all the alternatives, they finally settled on the Nestar system.

"At first we considered getting a basic small-business computer for each store, but we realized that for the larger stores we needed something that would allow us to support several terminals that access the same data base," Abrams says. "Nestar offered us a system that would allow us to start out small and then expand the network as the need came up."

The company's first priority was putting all customer files on the computer, which was no small task since those files had been building for 32 years. After that transition was made, the brothers went about putting the customer records of the two largest stores on the network.

"The smaller stores can be handled by the standard Apple II with a floppy disk, at least for the present time," Abrams says. "We anticipate putting them on the network as well if they eventually outgrow the Apple's capacity."

When a customer walks into one of Public Optical's two larger branches, clerks in locations throughout the store can call up the information they need in seconds to fill that customer's order. Are the glasses they ordered ready? Did they come with the tinted lens or the standard? Is the breakage guarantee in order? It's all there, right on the CRT screen.

The personal touch

The new system has also improved what Public Optical likes to call its "personal touch" with customers. Abrams states: "When we get a new customer, we make up a complete file with that customer's name, address, prescription, type of frame and examination record. We then send that customer a notice every year or two, reminding him that it's time to come in for a check-up. This seems to help our business by letting the customers know that we're thinking about them."

Before installing the Nestar network and the stand-alone Apples, Abrams says the customer reminder was a "catch as catch can" attempt at efficiency. With all customer records written out in forms and filed away in cabinets, it was virtually impossible to give the personal attention for which Public Optical was striving. Today clerks ask the system which customers are due for a visit, and the information is output in just a few seconds. A printer attached to the network prints out the reminders and they're mailed promptly.

"A year ago, I didn't know what a network was," Abrams says. "Today, I wonder how we ever got along without one."

Another approach

Like Nestar, Corvus Systems offers an economical approach to networking personal computers, both in its CONSTELLATION and in the recently introduced OMNINET sys-

tem. Each system is capable of supporting up to 64 computers on a single network. As with the Cluster/One, additional users can hook up to the system by adding interface cards and special cabling to their computers.

Both Corvus networks offer users access to mass storage in the form of Winchester disk drives that are shared by all users on the system. Users can also access expensive high-speed printers. Direct communication between user stations is another standard feature of both CONSTELLATION and OMNINET.

Unlike Nestar, which offers networking exclusively for the Apple, Corvus provides networking capability for a number of personal computers in addition to the Apple. These include Altos computers, the TRS-80 Model I and II, and Cromemco, Exidy and North Star systems.

One Apple II Plus user is Ted Boutacoff of Coherent, Inc. in Palo Alto, Calif. He decided that an in-house network was the way to go, and chose Corvus to meet his information needs.

Coherent is considered the world's leading supplier of laser-based products for the medical community, and the second leading supplier of laser products in general. Thus, the 15-year-old company has more than its share of business-related data to deal with every day. Particularly in the area of accounting, Coherent employees have long been pushed to their limits in dealing with the enormous amount of data that pertains to both the headquarters operation and those of subsidiaries around the world.

A bushel of Apples

Before the idea of networking arose, the company had purchased a single Apple II Plus to handle budget data such as bookings, shipments, expenses and profits. Then it became apparent that one Apple just wasn't enough.

"It didn't take long to discover that with all the budget information that had to be handled, putting the data on diskettes wasn't going to do it," Boutacoff says. His budget had already filled 70 diskettes and was growing when he made the decision to go with something bigger.

With the amount of information that had to be managed, time-sharing was not an efficient solution to the problem. The company needed a lot of storage capacity and fast access to the information that was being stored. The one solution that did make sense was an in-house network.

Coherent started out small. Two Apple II Plus computers were placed in corporate accounting and were tied into a 10-megabyte hard disk for additional storage. All the information from the 70 diskettes was transferred to the hard disk, making immediate access to all budget data possible.

Boutacoff soon found that two computer stations weren't enough. He expanded with three more computers in cost accounting, two in marketing/forecasting and one in engineering. He wouldn't be surprised to see that number grow.

More memory

"We foresee a continuing need for personal computers and the type of mass storage afforded by the network system," he says. "A network based on personal computers offers everything we need to perform more efficiently. It offers a communications capability, mass storage, fast access and most of all, user stations that can either work independently of one another or as a team."

While supporting substantially fewer users than either the Nestar or Corvus networks (eight maximum), Micromation's M/NET system offers a more powerful local-networking capability than the other two networks can provide. When using the Apple II on either the Nestar or Corvus networks, each user has independent use of 48 kilobytes of memory at a given station. Under M/NET, each user station is provided with 64 kilobytes of independent memory, in addition to the shared access to mass storage from the network's hard disk.

Unlike Cluster/One, CONSTELLATION or OMNINET, M/NET does not employ traditional personal computers at each user station. Instead, standard CRT terminals are installed at each station and 8-bit microprocessor cards are installed in a single cabinet for each user on the network.

Since each user is allocated his own central processing unit (CPU), accessing speed on M/NET tends to be faster than on other standard local-networking systems. In networks run by a single processor, the addition of multiple users tends to considerably slow access time.

One group of users, members of the Worcester, Mass., diocese, chose M/NET primarily because of this faster access time.

"For the kind of work we've been doing here, a multi-user system was absolutely mandatory," says the Rev. Donahue, who was instrumental in choosing a networking system for the diocese. The work to which Donahue refers needs what a local network can offer. From January to September 1981, a detailed census encompassing the entire diocese was taken. Collecting information on 335,000 people in 128 parishes was quite a task, involving the cooperation of more than 1000 church volunteers.

"The census is only taken every 10 to 15 years," Donahue says, "so the information we collect is quite involved."

continued on page 73

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Ken McLamb

Easier economic modeling with personal computers

Personal computers are being used by government bodies and corporate bodies alike to forecast economic futures

Every business enterprise, whether it's a corner candy store or a multi-billion-dollar conglomerate, tries to look at the future. New opportunities and new limitations will come with changes in the economic environment. Future prosperity or even survival might well depend on the quality of the plans the company makes to meet the new conditions.

Every country as well must try to envision the future, much as a gypsy must study her tea leaves. Whether a government is studying macroeconomics, or a company is studying microeconomics, one thing is sure: There's a better chance of a more accurate reading if the information input goes into a computer rather than a teacup.

Until recently only large corporations were able to draw up forecasts—for themselves in the context of their industry, and in the wider context of economic conditions in general—that stood a much better than random chance of being correct. The simple reason was that only a computer could crunch the numbers and juggle the variables to make acceptably reliable projections, and only a big company could afford to have a computer at its service.

That situation is quickly changing. Today a company with a medium or even modest operating budget can put the wondrous science of modern econometrics to work in practical, dollars-and-cents planning.

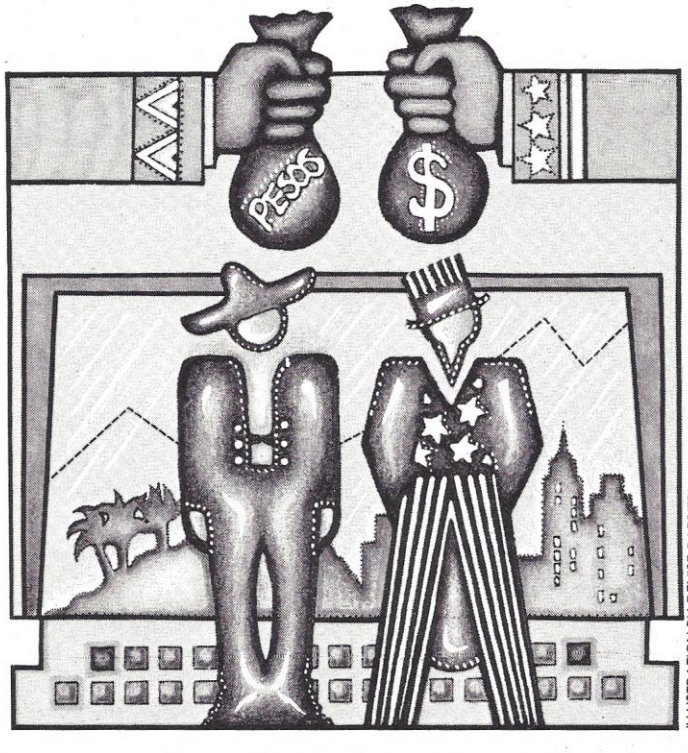

ILLUSTRATION BY DENISE BARBERI

For example, your company manufactures grade-A gizmos and has a 3.5 percent share of the national market. If you increase prices slightly while doubling the advertising expenditure over the next year, what is the probable market share in the second quarter of 1983—in the view of the rates of inflation, interest, federal taxation and real economic growth—that are most likely to prevail for that time period? Suppose you decide instead to maintain advertising at the present level, but cut prices?

Ergo, econometrics

Solving this complex problem would be hopeless without an econometric model, derived by applying mathematics and statistical methods that put known economic facts into the needed perspective.

Econometrics, having an awesome appetite for facts and for reconstituting the consumed information, is virtually hopeless without a computer to speed up the job. It's hardly infallible in

the usually assigned task of creating a picture of the future. A dramatic and unforeseeable reversal of trends—the 1974 oil crisis is a stark example—can destory the best of premises and assumptions. But econometric techniques serve to educate guesses so well that no major corporation, institution or government body would make an important commitment of resources without consulting the read-out.

The advantages of using econometric models are now coming within the reach of a greatly widened number of economic entities, most notably small-businesses which have at least as much need for reliable forecasts as their larger competitors do. What makes it possible? Computers again, naturally. Not the big mainframes that are still beyond the needs and the budgets of smaller companies, but personal computers.

The personal computer systems available until about a year ago were too limited in power to even remotely approach the functions of large systems in providing data to support business planning. Advances in hardware and especially in applications software have narrowed the gap considerably.

Economist David M. Chereb, who has much experience with economic modeling on computers at both ends of the size-and-price spectrum, estimates that 90 percent of all companies can perform 90 percent of their business simulations on a personal computer. "Now you can do a great deal of sophisticated business planning with a personal computer," he says.

Chereb became a pioneer and apostle of the personal computer as a business-planning tool, even though he has made a career of working with some of the biggest and most powerful computers. He had a role in planning NASA's future space activities while in the Air Force, and became a senior economic analyst with Northrop before taking his present position as manager of marketing systems for McCulloch Corp., the Los Angeles-based chainsaw manufacturer.

Charting the course

Chereb's work at McCulloch includes forecasting the U.S. economy and creating programs for computer simulations as aids in the formulation of business strategies. A couple of years ago, while acting as consultant to help other parties in setting up computer-based forecasting, he became intrigued by the potential personal computers had to do much of that job less expensively for a greatly broadened part of the business world.

The personal computers of the time already had the essential capability with a few limitations a small company normally could tolerate, particularly in data-storage capacity. But relevant software was spotty and afforded no possibility of putting together a start-to-finish, macroeconomic-and-microeconomic system which would enable a company to chart the course of the economic variables of most concern, and to plan to react accordingly.

After designing the software he needed, Chereb started a company last summer to market two software packages whose output, when used as input for VisiCalc or other financial-modeling programs for a company's own "what-if" exercises, completes the macro-to-micro continuum of econometrics.

"The personal-computer user obviously makes a number of compromises in absolute terms," Chereb states, "but in relation to the more modest volume of data to be processed and a nearly equal quality of performance by the system, the small company actually gets far more value per dollar spent.

"The disadvantages of personal computers versus big machines," Chereb also feels, "include operability by just one person for one purpose at a time, which isn't often a problem for a small company. Lower processing speed is another disadvantage, also not really important as the difference is counted in minutes rather than hours, and limited memory and on-line data-storage capacity are others. An inexpensive purchase of extra memory will carry a company a long way, and the addition of hard disks with Winchester disk drives, while not an inexpensive item for a small business, is an optional investment that would serve the on-line storage needs for a very long time."

In software for econometric simulations, large computer systems also have an inherent but not necessarily significant advantage in processing power. A typical 8-bit personal computer with 64k of random-access memory could run a macroeconomic model that incorporates a maximum of perhaps 50 equations to solve for economic variables. These variables include interest rates, consumer demand, unemployment levels, etc. In contrast, the commercially available models for large computers (Chase Econometrics, Wharton Econometrics, Data Resources and others), are provided to subscribers at an annual cost that can run well into thousands. These models use between 500 and 1000 equations.

The higher mathematical capacity might be valuable to a large company with some esoteric questions to answer, and it permits subdivision of the economy into more sectors. In Chereb's view, the equation-crunching ability of a personal computer is more than adequate for the normal needs of a company of any size. He settled on 30 equations in the final form of his macroeconomic model for small-to-medium sized business.

"An interesting statistical phenomenon," Chereb says, "is that the accuracy of smaller models for predicting, say, gross national product, is not direclty related to the number of

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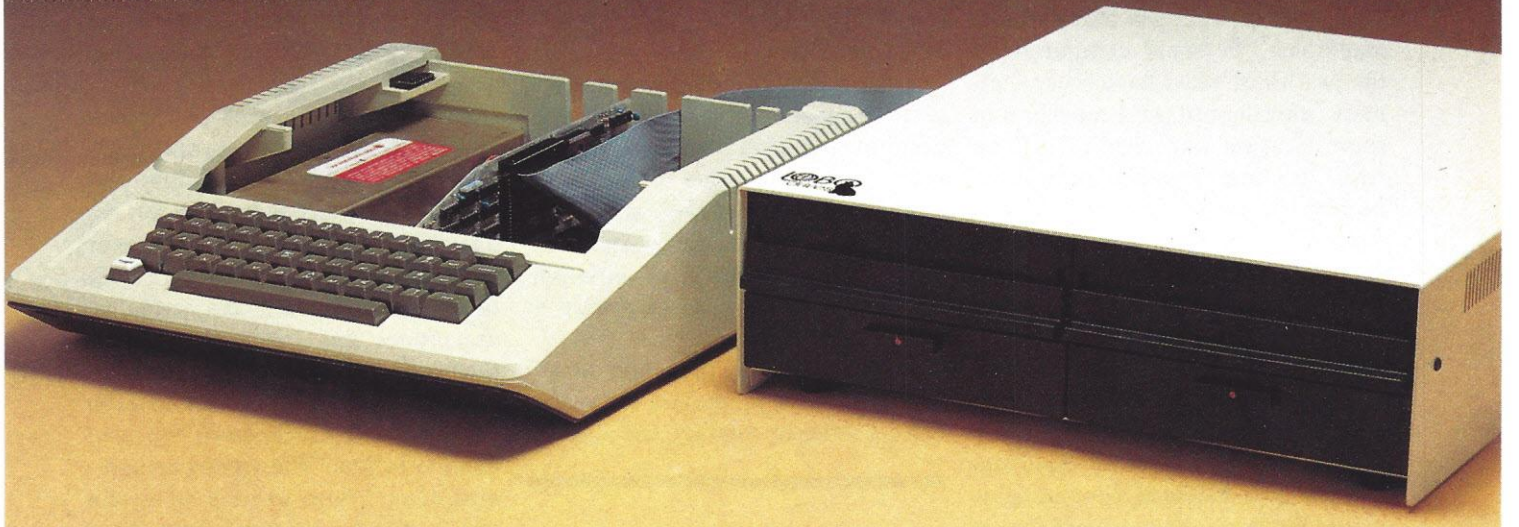

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CIRCLE 15

equations. Models with as few as five or six equations do fairly well at predicting GNP, and almost as well as models which contain 500 or 800 equations."

Incredible capability

As a veteran of a big-business world that counts its computers by the roomful, Chereb is astonished by the overall capability of today's small machines. "Personal computers in the past three years have become almost equivalent to large machines in sophistication and flexibility," he says. "It's been possible because the hardware and software in the personal-computer field benefited from 20 years of development in data processing and didn't have to follow the mainframe development path all over again. Small computers started off pretty much from where the big ones had arrived."

At its present level of maturity, Chereb says personal computing is poised for "a significant surge rate in the development of decision support systems in software—aids for business decision-making." That aim is high on the agenda of a January conference in San Diego on "Modeling and Simulation on Microcomputers," organized by the Society for Computer Simulation.

Chereb foresees advances such as an economic/financial model for personal computers that integrates statistical functions, graphics, a report writer, a data-base management system and an English-like higher-order simulation language, all in a single software package.

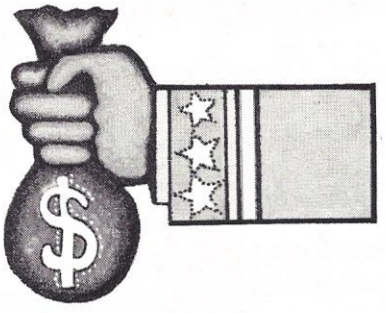
The software developed and now commercialized by Chereb has many of the features of his anticipated dream package. It's actually two packages, a set of data handling and analytical programs called The Business Planning Package, and the macroeconomic part, called The U.S. Simulation Model. Both are presently compatible only with Radio Shack computers, but will be adapted in the coming months for the Apple II and the many machines with CP/M operating systems.

The aim of the software system is to project the business climate for a company's products and to project the impacts of various factors on sales and the company's financial condition.

The models

There are three modules. One forecasts national and regional economic conditions in parameters chosen for their known relevance to the company's fate: Interest rates and housing starts if you're in the construction business, for example, or inflation and consumer savings if you're a mortgage lender.

These outputs are then input into a second module to project sales and market share by product. Included in this module is information on the company's marketing and advertising strategy, competitor's actions and other possible influences.



The third module is the financial simulation. When projected sales-by-product are entered, the output is a formalized income statement and balance sheet for the succession of periods covered by the sales projections, plus the company's major financial ratios.

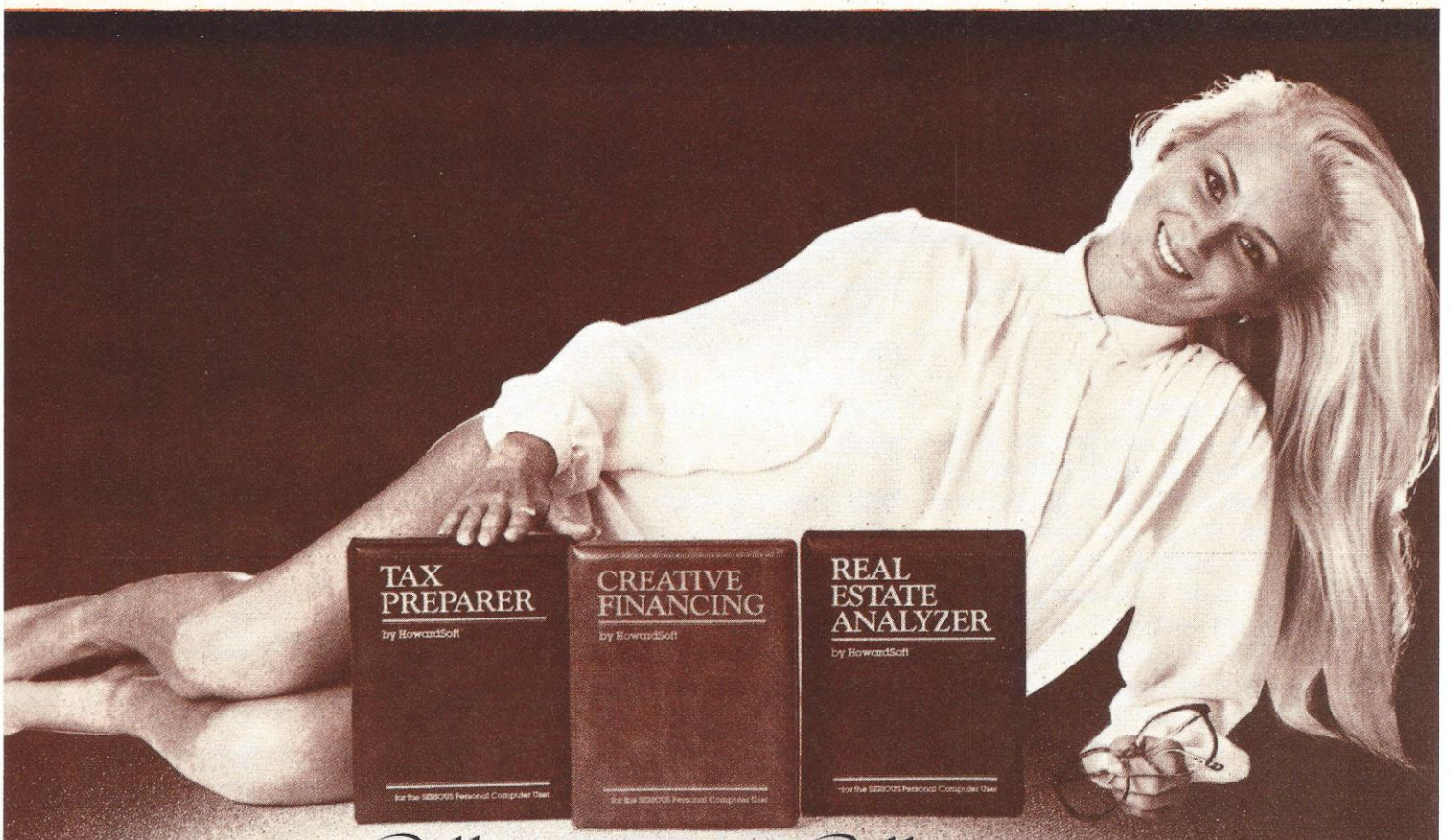
That's what the system accomplishes. Operating time is about 20 minutes from the start of entry of the macroeconomic parameters until the final printout.

The econometric foundation for this system is the data stored on the national model disk, tracing the quarterly performance in each of the parameters back to 1955, and projecting up to eight quarters ahead according to modified Keynesian principles.

After new input, such as changes in tax rates, money supply, announced government spending and long-term growth estimated for the national economy, the computer model solves a set of simultaneous equations—the prameters are interdependent and inseparable—and then goes on to solve a block of recursive equations. The answer to each equation will knock down the next domino in line. The computer operator doesn't have to have an economist's head for current figures. They are updated as part of the software package and are also easily obtained from published sources including the weekly bulletins from the U.S. Department of Commerce.

The macroeconomic model is thus a sort of à la carte menu for forecasting the variables that will have a significant effect on the company's operating environment and business results, but are beyond the control of the company. The sales-forecasting model enables the company to put its own unique set of variables, including actions and trends it *can* control, into equations that will solve against the macroeconomic probabilities.

The outputs of the company sales-forecasting model are the projected sales by period for each product or product line, up to a maximum of about 30 products and 15 time periods within the capacity of a personal computer. If the module is used near its maximum capacity, it will likely have to be chained into or overlaid



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onto the macroeconomic model, which is easily achieved on a disk system.

Weighing effects

At this stage, the operator or the information user could halt the process to make changes in the input parameters and get new results. To use an earlier example, this is where the sales manager would manipulate the advertising budget at several hypothetical levels to see what effect each might have on future market shares.

The process is then ready for the financial model. This model allows two input options, desired sales or desired after-tax earnings, for generation of income statements and balance sheets to show projected levels of assets, debt and available dividends. The heart of this part of the system is decision rules to determine how the model will calculate the outputs.

Suppose, for example, the company wants to explore the future course of common dividend payouts. Once the retained earnings have been projected, there are three possibilities. In the low-earnings scenario, if the earnings available for dividends at a given time are less than the desired addition to retained earnings, the dividends become zero. In the case of very high earnings—so high that the amount remaining after additions to desired retained earnings would permit more than the maximum desired dividend per share—the decision rules might nonetheless limit the dividend read-out to the desired maximum. In the third and most typical case between the extremes, the dividend pool becomes the amount left over after targeted additions to retained earnings have been deducted from the projected current earnings.

"Because it's unrealistic to expect any model to forecast the future exactly," Chereb says, "a crucial feature of a planning model is its ability to handle different scenarios."

Chereb says there are several sources of uncertainty that make it unwise to expect the gospel truth about the future from any planning model.

Only partial gospel

The values of the inputs might be inaccurate. For example, the course of energy prices or interest rates assumed for the model might vary greatly from the actual events. The model's outputs will then be correspondingly in error. There is also some uncertainty associated with the coefficients of the equations. A coefficient for price, perhaps indicating that a 10 percent drop in price will lead to a 20 percent increase in unit sales, might make all the sense in the world according to sound statistical methods but still not yield the true price/demand relationship during the selected time period.

An econometric model also has some structural uncertainty. Because an attempt to include every possible variable and relationship among them would be impossible, one of the aims of the science is to weed out the less important variables so that those known to be important are more accessible for clear examination. But mistakes are still possible. For example, before 1974 few models included energy as a variable.

As Chereb says, "All models are simplifications of the real world. They try to include the major influences but do not include *all* influences. None of the sources of uncertainty can be entirely eliminated. The goal, then, is to try to reduce the range of uncertainty by careful model building and to use the simulation results as a guide to what probably will happen.

"Good planning models increase your odds of being right about the future," Chereb states, "and that's worth a lot of money for a company."

continued on page 39

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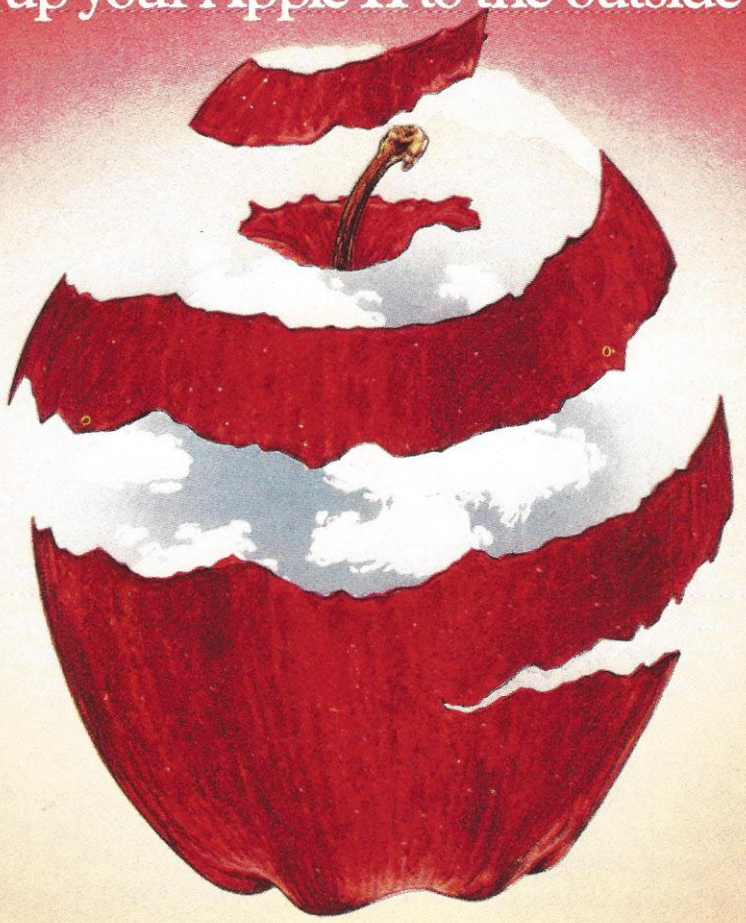

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CIRCLE 57

continued from page 36

Modeling the economy of Mexico

The government of Mexico decided to attack the problem of underdevelopment in the northern provinces by collecting a vast amount of localized economic data, analyzing the results and projecting trends. The analysis was to be used to identify industrial-investment opportunities which would then be brought to the attention of capital investors, particularly those from abroad.

A Mexican government agency asked Gillis, Haldi & Clarke, a New York consultancy, how to set up and execute the mammoth handling of information, which obviously required a great deal of computer power. Gillis, Haldi & Clarke, in turn, commissioned a specialized data-processing consultancy, McMullen & McMullen in Westchester County, to recommend computer systems and a flow of data tailored to the job.

"Why don't you deploy personal computers in the right place at the right time?" asked McMullen & McMullen. "They can pass data back and forth with remote mainframe computers, they're easy to move to new locations when needed, and after all the facts and figures are compiled, they're sophisticated enough to do the analysis. The cost is also much less expensive than any other means of obtaining additional hardware and software capability."

Taking this advice, Gillis, Haldi & Clarke installed three Apple II systems on behalf of its client, Direccion General de Promocion Fiscal. One system was first placed at the GH & C headquarters to coordinate the storage of existing data on a mainframe at Cornell University. A second Apple went to work at a field office in Mexico to prepare for processing new information that would be gathered in questionnaires for regional authorities and industry. The third became the Mexican government's first on-line personal computer. GH & C then trained Mexican personnel to operate the latter two systems.

The project is now in midstream, and the GH & C coordinator has packed his Apple along with his suitcase to stay in Mexico City for the duration. All three personal computers can now talk with each other as well as with a mainframe belonging to the Mexican government.

If the question of how to organize a project of such macroeconomic/microeconomic intricacy had been presented to John McMullen any time until the late 1970s, he would have automatically started devising mainframe configurations and communications paths. His career had been entirely in big-business data processing. He was dp manager for the Morgan Stanley banking and investment concern at the time he started the consultancy, and his wife and partner, Barbara E. McMullen, also had 20 years of executive experience in corporate data processing. For the McMullens and their large-corporation clientele, computerization meant big computers.

John McMullen continued his "big-computer" thinking until he bought an Apple II for his own use, and found it to be remarkably capable for such a small machine. Then he made an even more remarkable discovery: In addition to the early video games and some straightforward practical software for such purposes as recording expenses, several software producers began marketing packages that would perform complex and sophisticated analytical tasks, which are especially helpful as tools for planning.

The turning point for McMullen was the introduction of VisiCalc by Personal Software. This financial modeling package serves as an electronic spread sheet, allowing the user to manipulate rows and columns of figures at will. From the time VisiCalc was first paired with Apple II, the McMullens have progressively reoriented their practice to the point where they now do 99 percent of their work with personal-computer systems—still primarily for a big-company clientele. They have recommended a variety of systems tailored to the intended applications, but most often have settled on Apple II because of its wide and mature field of supportive business-oriented software.

John McMullen is also excited by the advent of IBM as a personal-computer manufacturer. He regards the systems themselves as highly promising, and feels that IBM's prestige "legitimizes" a sector of computing that has been only vaguely understood by much of its potential market. "The IBM entrance should attract the attention of a lot of people who have been dubious up to now," he states.

Personal Computing asked McMullen how large a segment of the business community—large and small companies alike—he believes would share his present total conversion to faith in personal computers as instruments of analysis and planning.

McMullen says that the current level of awareness of personal-computers' performance capacity is "ten thousand times what it was a year ago, and we still haven't scratched the surface."

Even though a small company might well get the highest value by installing a personal-computer system for multiple functions that include planning, McMullen says that large corporations are much more aware at this point of what personal computers can do for them within the overall scheme of big-business.

Big companies have long been accustomed to having their big computers do the work of a thousand employees for bookkeeping and order processing, McMullen states, and these companies have given financial planners the lowest priority in the demand for computer time. It might be the fault of the planner who often doesn't know what he's looking for from the data.

But VisiCalc and a variety of other "what-if" instruments have come along, planners have had the opportunity to massage some data, look at the results and repeat the process if they don't like what they see—placing little or no burden on the company's dp set-up.

The corporations have been glad to oblige, in the experience of McMullen, who sees an anomaly in statistics that say an average American farm backs up its workers with $40,000 of capital equipment per worker, and industry spends $20,000 per blue-collar employee and $2000 per white-collar employee. Personal computers have thus been able to locate "a marketplace that has not been tapped before."

Put yourself in control with personal computing

Small machines are finding use in control applications in the home and in industry

As people become more accustomed to the idea of personal computing, they find there are more and more applications for their computers. While business applications like accounts payable and general ledger may provide the impetus for purchasing a personal computer, other applications are soon programmed for the machines. Some of these applications surprise people who tend to look down on the abilities of small, inexpensive computers.

One such application is control. Personal or small computers are used more and more for these applications. They're turning lights on and off, filling swimming pools in peoples' backyards and even controlling processes in large chemical plants.

Control applications can be very simple or very sophisticated. The more sophisticated the application, the more expensive its implementation will be.

Very sophisticated applications are often those that control many variables in a process. Signal feedback is used to control those variables. Systems that control chemical mixtures, or that control the angle of the ailerons on the wing of an aircraft are two examples. These systems work by comparing the value of a variable (the concentration of sulphuric acid in a mixture, for example), to the value that variable should have. The desired value must be provided by the person who initially sets up the system.

A signal proportional to the measured value is then added to the signal representing the desired value. The sum of the two signals is now used as the new input to the process, causing the process to output a new value. The new value is then measured, and the measured signal is added to that representing the desired output. The process then repeats itself.

There is a very extensive body of theory on the use of these automatic-control systems. Many applications don't require a thorough understanding of that theory. Many control applications are simply on-off opertions.

In the labs

One of these basic operations can be used in a test laboratory. Engineers may wish to run a continuous test over a long period of time. To accomplish this test there are two options. One is to hire someone who constantly monitors both the equipment under test and the test equipment itself. The other is to use a computer that monitors both pieces of equipment.

Cromemco president Harry Garland applies the second option. His company uses one of its own System Zeros to control the burn-in ovens at its plant. (Burn-in is the process of running electronic equipment at high temperatures for prolonged periods of time to catch failures occuring under these conditions.) The system controls the oven temperatures used in the process, and cycles from one pre-set temperature to another at specified time intervals.

Another user who applies the second option is Harvey Cogen. He is using a small computer for automatic control of equipment in a house/laboratory. This house/laboratory is used to test the effectiveness of solar energy. Cogen uses the computer to simulate the activity of a family who would be occupying the structure under normal circumstances.

To control the house, Cogen uses a TRS-80 personal computer as a "straight controller." The computer is used as a latched output port, which means that when a particular signal line from the computer assumes a particular value, that value remains constant (is latched) until the computer actively changes it on the line.

If at a particular time of day hot water is to be drawn from a holding tank, the computer will bring an output line that controls a valve on that tank to a level that means "open the valve." That line will activate a relay,

which in turn causes the valve to open. In some applications, the action is direct. In others, it occurs through the action of one or more relays, because the power required is more than the computer alone can handle.

Keep it hot

"We were mainly concerned," says Cogen, "about the hot water. So we draw off hot water three times a day, but this is not our only testing concern. We have photocells on the roof that can generate 5000 watts of electricity every hour. To really test those cells we needed to provide a load. That's why we simulated the family's activity with the computer inside the house. It provides the variable load that can really show what the effect of the solar cells on the house will be."

This test house is not the only kind of laboratory that a personal computer can control. Bill Henry of Avondale Mills in Sylacagua, Ala., is using a computerized test system based on a Vector Graphic machine to test the quality of cotton fiber. The instruments that do the actual measurement were designed to hook up to an expensive minicomputer. Instead Spinlab (Special Instruments Laboratory located in Knoxville, Tenn.), the system supplier, was able to control the instruments with the lower-cost personal computer.

At the J.P. Stevens textile mill in Greenville, S.C., Spinlab had to contend with the presence of an IBM central computer. Communications software had to be installed to "fool" the mainframe into "thinking" the Vector Graphic machines were intelligent terminals. Information gathered by the small computers in their instrument-controller role can then be fed to the mainframe for logging and processing.

Both of these latter examples show what is becoming one of the truths of computerized control. With enough diligence, people don't need to use hardware from one vendor to get the control system they want. For those who don't care to spend the time and money to custom program an application with different hardware from different vendors, systems are provided by a single source.

Carl Holberg and his computer-

Personal computers can be used to test cotton fiber, as at the J.P. Stevens textile mill and the Avondale Mills.

The guy on the left doesn't stand a chance.

The guy on the left has two file folders, a news magazine, and a sandwich.

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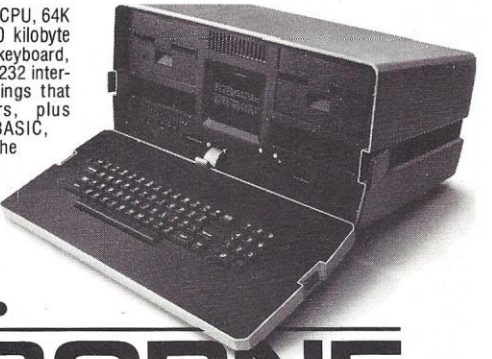

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ized test house provide an example of a custom-programmed application. Holberg has some instruments that operate on the IEEE (Institute of Electrical and Electronic Engineering) 488 bus. This is a standard bus that was developed specifically for instrument control. The instruments all connect to the bus using standard connectors. (This is a much better standard than the RS-232-C interface standard. Many people say their equipment has an RS-232 port, but what that means in many cases is that the connectors will plug into the computer.)

Holberg has found that it's easier to operate with the IEEE-488 bus, despite the fact that manufacturers implement the bus differently. If a manufacturer makes 488-compatible meters and 488 controllers, he will probably have done some programming to make it easy to interface his controller to his instruments. A controller from another manufacturer will also be able to control the instrument, but it won't be as easy.

The hard way

Holberg decided to take the more difficult route. He's using a Commodore 8032 with instruments from Hewlett-Packard to do the data acquisition on the solar house. (The house uses TRS-80s to control the on-off functions.) In this way, Holberg is making both simple and fairly sophisticated use of small computers in automatic-control applications.

The uses for control applications can get even more sophistiated, to the point where they can be used to run whole plants.

One user, we'll call him Harry Jones, has been working on a secret project that has the potential to yield vast profits for his company. Jones feels that this project is so important that he does not wish to divulge his real name or the name of his company.

Jones started with a Cromemco system to control an entire chemical plant. He was familiar with the system's architecture, so he modified it. This was a fairly easy task since Cromemcos use the S-100 bus. What Jones finally came up with is a double computer in one box, using slots in the S-100 backplane. One of the processors is the "boss," or machine that allocates tasks and takes reports. The other processor is the "exec," the unit that really gets the work done.

Jones has a total of five machines connected in a network that act as remote computers for this boss/exec combination. That combination constitutes the real brains of the operation, and it's the one aspect of which Jones is most proud. "The real key," he says, "in what I regard as an elegant beauty is that pair of computers, one of which has no time-bound commitments in the system's operation other than receiving status reports. The other does all the work."

Jones says that the advantage of this pairing is its ability to make the total system "very friendly to the outside world. You can make a very powerful yet friendly system this way. That was my idea going in, and I'm really pleased that that's the way it worked out. In fact, it came out even better than I hoped at the beginning," he states.

This application, controlling an entire chemical plant, is very sophisticated. Other process-control applications aren't nearly as demanding. Acrolog, for example, a Torrance, Calif., machine-tool manufacturer, uses Apples to program its tooling machinery. The personal computers are too slow to run much of the high-speed machines, but they do eliminate the time that was needed before they were brought in to program the control machines themselves. The Apples are used to emulate the processors found in the tooling machinery. Programs can then be developed while the big tool machines are still on-line in other applications.

Lauretta Schaper also has a process-control application. As the co-owner of Awards, Inc. of Los Angeles, Calif., Schaper uses a TRS-80 Model II personal computer to run an engraving system.

The way it was

Before the computer was brought into the shop, the company used a pantographic machine for the engraving process. This machine needed not only a typefont (letter templates) setup but needed to be adjusted for the size of the needed lettering. Each letter had to be set up individually, and the machine could only accept four lines of letters at a time. After the four lines were engraved, the letters were replaced in their storage locations and the process would start over again. This consumed both time and money.

Operators also had to set up individual letters in a rack, from which the machine would operate. If there were too many E's in the text to be engraved, the whole inscription could not be done at one time. Part of the text would be engraved, and then the setup was changed to finish the remainder.

With the use of the computer the picture has changed. The machine is about three times as fast as the old system, and opertors can see exactly what will be engraved on the screen before the engraving starts. There is never the danger of running out of individual letters either. The letters only exist in the memory of the computer.

The only caveat in this apparently perfect picture is the cost. By the time all the parts have been added up, according to Schaper, the whole package including the cutters, the pheumatic equipment, the compressor and the computer runs about $20,000. This equipment, purchased from Dahlgren and Associates in San Francisco, costs much more than the pantographic machine. But as

Schaper says, "We think that the system will have paid for itself in a year, or two at the most. After that, the system will last indefinitely. There's nothing to break down."

What else?

The machine can also do fine calligraphy, writing on parchment, routong, burnishing and reverse engraving. The only thing it won't do for Awards is engraving on curved surfaces. For this reason, the company retains its human engravers. They are needed for silverware, bowls and other curved materials.

Another application similar to the one used at Awards is used by Cocem Laser Center, which makes parts for the aerospace industry. The parts are cut and welded with laser beams, and these beams must be directed to the proper place on the part. Instead of moving the laser beam to accomplish this, there is a moveable work table on which the parts are placed. The controller that moves the table is an Apple computer.

The Apple is also helping out with control applications not related to engraving or parts manufacturing. Last year, for example, the Joffrey Ballet in New York used an Apple to control the lighting for an unusually complex modern ballet.

The TRS-80 is another computer making headway in control. At the Sheraton Inn in Springfield, Mo., this unit is controlling the inn's utilities for a savings of 17 to 40 percent per year.

Texas billiard parlors are also benefiting from control applications. Klicks Billiard and Mickey Finn, Inc. both use personal computers—the former has Apples and the latter TRS-80s—to control the lights over the tables. In both Texas-based chains, when the table time for which a customer has paid has elasped, the computer dims out the overhead light, giving an effective, albeit gentle, reminder that time has expired.

Even around the house

Controlling functions around the house is another example of what else people can do with personal computers. Home control, which will be discussed in much greater detail in a forthcoming issue of *Personal Computing,* can be illustrated by the experience of Avery Dee.

Dee is the director of planning for Corvus Systems, a manufacturer of hard-disk and networking systems. One might think that his work environment gives him a leg up in implementing home control, but, "I'm not a programmer," he says.

What Dee did for his sprinkler system, almost anyone could do. "It was a labor of love," he says. "But really, it wasn't that much labor, because the software that drives the system (an Apple coupled with a BSR/X-10 controller through a controller card from Mountain Computer) is all menu-driven. I didn't have to sit down and write a program at all."

There were some things he did have to do. The first was revamping the hardware for the sprinklers. The next was answering the questions that came up on the system's menu.

Dee says that the sprinkler system needed work anyway, so while the repairman was in the area, he put some low-voltage solenoid-operated valves in place of the normal hand-operated valves. (These are electro-mechanical actuators.) Six of the new valves were distributed around the property, each of which can control five pop-up sprinkler heads. Fortunately, the valves were placed fairly close to existing 110V outlets, so connecting wire runs were fairly short. The longest was about 12 feet.

Dee then ran twisted-pair wiring (similar to that used for doorbells) to the outlets, where the wires were connected to plug-in transformers, on the 12V output side. The installation of the valves was complete.

With the transformers plugged through the BSR appliance module (there are two kinds, appliance and lighting) into the 110 volt lines, the hookup of the transformer to the computer was complete as well.

"It was great," Dee states. "Once that had been done, I had control of all 25 sprinklers and the fill valve for the swimming pool. All I had to do was boot up the control program."

After booting the program, it gave him the option of running several different sprinkling schedules to allow for holidays and other special occasions. The pool had to be filled Wednesdays, to account for loss through evaporation. That took a different program. Dee had added lighting modules to the system as well. He put in different programs to turn lights on and off at different times, depending on the day.

The controller also includes other features. Using a clock card for the Apple from Mountain, the system can recover from a power outage at the proper time of day. There's also a power-use accounting package that tallies up the power consumed by all the devices Dee has on the controller.

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The Logo language is now available for your Apple II Plus* microcomputer. For further information write to us or contact your local dealer.

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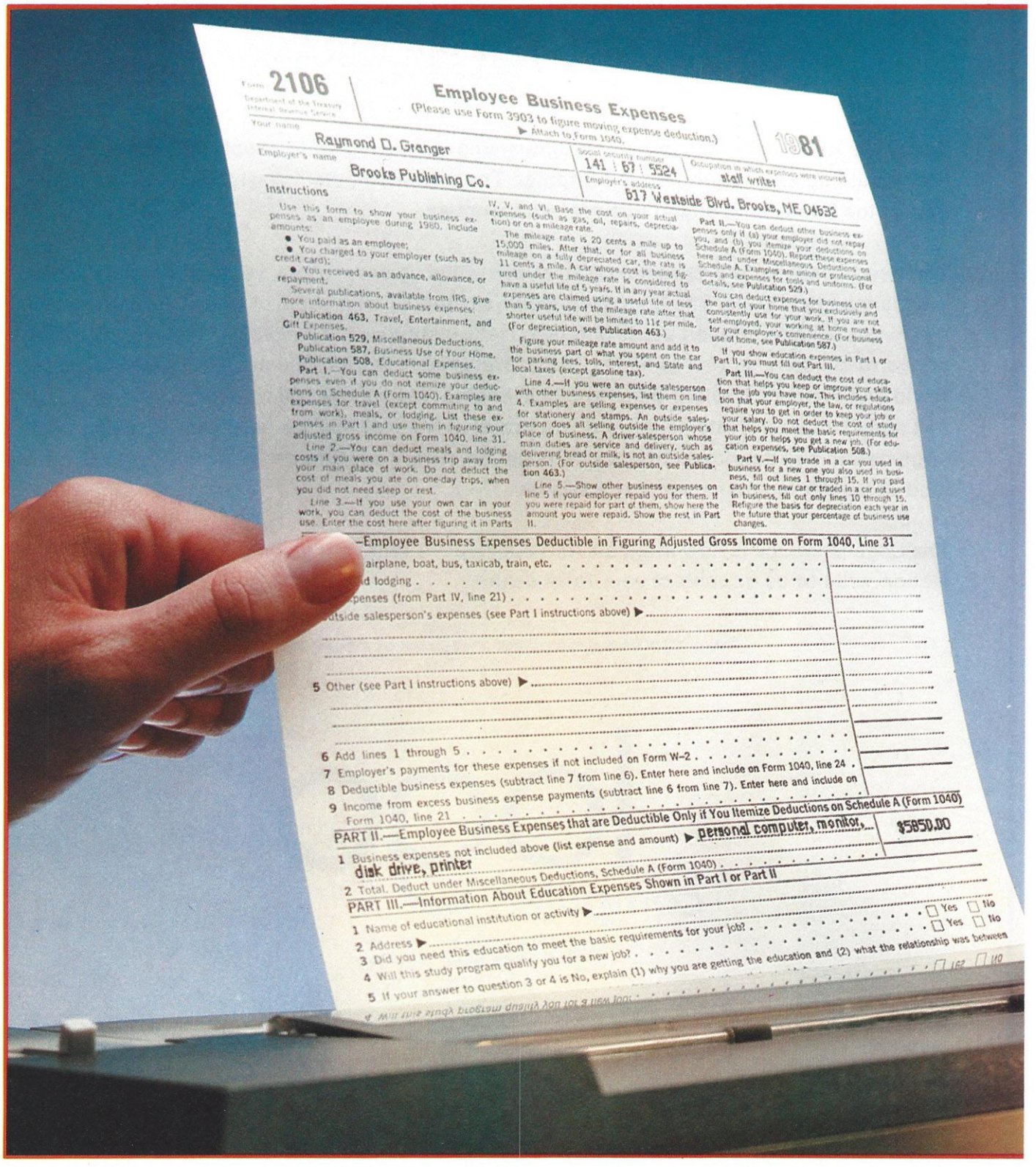
CIRCLE 19

BUSINESS COMPUTING



Form 2106 — Department of the Treasury, Internal Revenue Service

Employee Business Expenses

(Please use Form 3903 to figure moving expense deduction.)

▶ Attach to Form 1040.

1981

Your name: Raymond D. Granger

Social security number: 141 : 67 : 5524

Occupation in which expenses were incurred: staff writer

Employer's name: Brooks Publishing Co.

Employer's address: 517 Westside Blvd. Brooks, ME 04632

Instructions

Use this form to show your business expenses as an employee during 1980. Include amounts:

- You paid as an employee;
- You charged to your employer (such as by credit card);
- You received as an advance, allowance, or repayment.

Several publications, available from IRS, give more information about business expenses:

Publication 463, Travel, Entertainment, and Gift Expenses.

Publication 529, Miscellaneous Deductions.

Publication 587, Business Use of Your Home.

Publication 508, Educational Expenses.

Part I.—You can deduct some business expenses even if you do not itemize your deductions on Schedule A (Form 1040). Examples are expenses for travel (except commuting to and from work), meals, or lodging. List these expenses in Part I and use them in figuring your adjusted gross income on Form 1040, line 31.

Line 2.—You can deduct meals and lodging costs if you were on a business trip away from your main place of work. Do not deduct the cost of meals you ate on one-day trips, when you did not need sleep or rest.

Line 3.—If you use your own car in your work, you can deduct the cost of the business use. Enter the cost here after figuring it in Parts IV, V, and VI. Base the cost on your actual expenses (such as gas, oil, repairs, depreciation) or on a mileage rate.

The mileage rate is 20 cents a mile up to 15,000 miles. After that, or for all business mileage on a fully depreciated car, the rate is 11 cents a mile. A car whose cost is being figured under the mileage rate is considered to have a useful life of 5 years. If in any year actual expenses are claimed using a useful life of less than 5 years, use of the mileage rate after that shorter useful life will be limited to 11¢ per mile. (For depreciation, see Publication 463.)

Figure your mileage rate amount and add it to the business part of what you spent on the car for parking fees, tolls, interest, and State and local taxes (except gasoline tax).

Line 4.—If you were an outside salesperson with other business expenses, list them on line 4. Examples are selling expenses or expenses for stationery and stamps. An outside salesperson does all selling outside the employer's place of business. A driver-salesperson whose main duties are service and delivery, such as delivering bread or milk, is not an outside salesperson. (For outside salesperson, see Publication 463.)

Line 5.—Show other business expenses on line 5 if your employer repaid you for them. If you were repaid for part of them, show here the amount you were repaid. Show the rest in Part II.

Part II.—You can deduct other business expenses only if (a) your employer did not repay you, and (b) you itemize your deductions on Schedule A (Form 1040). Report these expenses here and under Miscellaneous Deductions on Schedule A. Examples are union or professional dues and expenses for tools and uniforms. (For details, see Publication 529.)

You can deduct expenses for business use of the part of your home that you exclusively and consistently use for your work. If you are not self-employed, your working at home must be for your employer's convenience. (For business use of home, see Publication 587.)

If you show education expenses in Part I or Part II, you must fill out Part III.

Part III.—You can deduct the cost of education that helps you keep or improve your skills for the job you have now. This includes education that your employer, the law, or regulations require you to get in order to keep your job or your salary. Do not deduct the cost of study that helps you meet the basic requirements for your job or helps you get a new job. (For education expenses, see Publication 508.)

Part V.—If you trade in a car you used in business for a new one you also used in business, fill out lines 1 through 15. If you paid cash for the new car or traded in a car not used in business, fill out only lines 10 through 15. Refigure the basis for depreciation each year in the future that your percentage of business use changes.

PART I.—Employee Business Expenses Deductible in Figuring Adjusted Gross Income on Form 1040, Line 31

airplane, boat, bus, taxicab, train, etc. . . . . .

d lodging . . . . . .

penses (from Part IV, line 21) . . . . . .

utside salesperson's expenses (see Part I instructions above) ▶ .....

5 Other (see Part I instructions above) ▶ .....

6 Add lines 1 through 5 . . . . . .

7 Employer's payments for these expenses if not included on Form W-2 . . . . . .

8 Deductible business expenses (subtract line 7 from line 6). Enter here and include on Form 1040, line 24 .

9 Income from excess business expense payments (subtract line 6 from line 7). Enter here and include on Form 1040, line 21 . . . . . .

PART II.—Employee Business Expenses that are Deductible Only if You Itemize Deductions on Schedule A (Form 1040)

1 Business expenses not included above (list expense and amount) ▶ personal computer, monitor, disk drive, printer — $5850.00

2 Total. Deduct under Miscellaneous Deductions, Schedule A (Form 1040) . . . . . .

PART III.—Information About Education Expenses Shown in Part I or Part II

1 Name of educational institution or activity ▶ .....

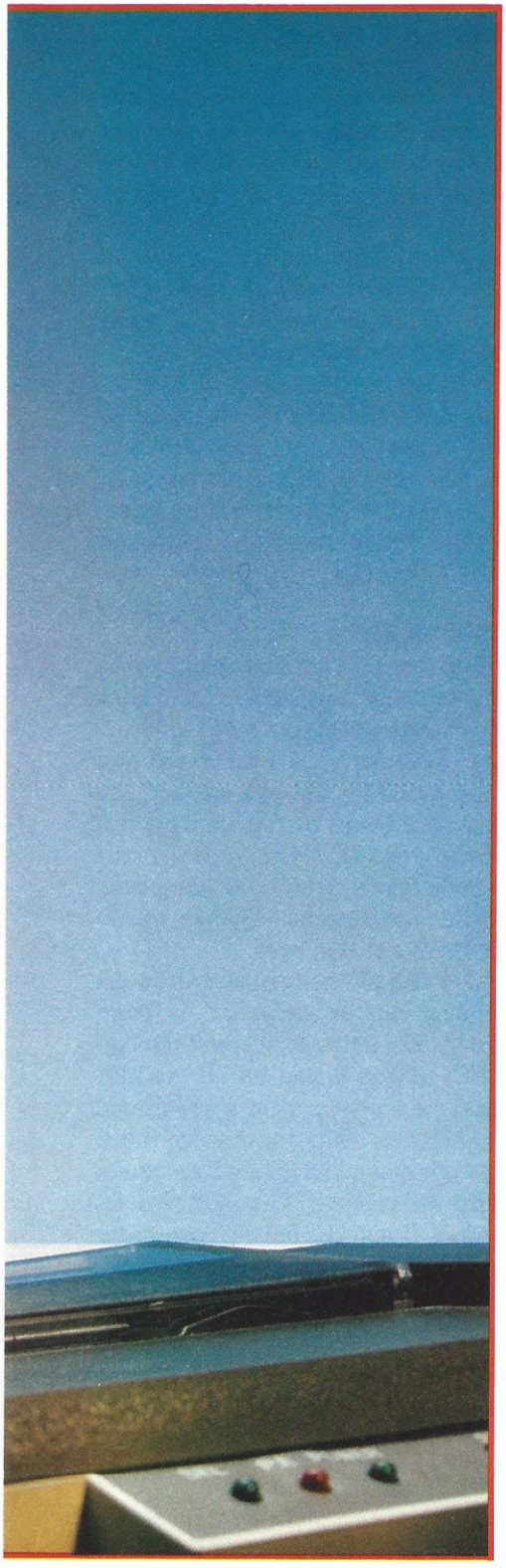
2 Address ▶ .....

3 Did you need this education to meet the basic requirements for your job? . . . . . ☐ Yes ☐ No

4 Will this study program qualify you for a new job? . . . . . ☐ Yes ☐ No

5 If your answer to question 3 or 4 is No, explain (1) why you are getting the education and (2) what the relationship was between

Robert Perry



Tax-preparation software: how to ease the IRS blues

A bevy of tax-preparation packages to ease the federal (and sometimes state) tax-time burden

It's almost that time of year again—not the holiday season, but the tax season. It's the time of the year that Uncle Sam is jolly while the rest of us pout.

Since the income tax was first levied, tax time has always been the bane of accountants as they labored long and hard with pencil and paper to squeeze every allowed deduction or credit out of their clients' tax returns. Accountants will attest that most of their time in this crazy season is spent doing essentially rote clerical chores or number crunching with a calculator.

Even those accountants in large practices that use remote time-sharing or batch-processed tax-preparation methods still spend long hours figuring alternatives for their clients.

Today, with personal computers, all of this manual labor and drudgery can be a thing of the past. Computers can crunch numbers more rapidly than a speeding bullet and leap through many alternatives with a single bound—if the computers have the right software to do these things.

Unfortunately, unlike basic accounting packages of which there are dozens, very few income-tax preparation programs are available for personal computers. Even fewer programs are available for state and local income-tax returns. Of these, only the most populous and wealthy states are covered such as New York and California.

Why are so few programs available when the potential market for income-tax software is so large? First, the accounting profession at which most of these programs are aimed is notoriously conservative and seems loath to give up sleeve garters, eyeshades and ledgers to join the 20th century. Although the market potential is huge, it has been very, very slow to develop. One of the largest tax-software companies, Contract Service Associates in Anaheim, Calif., does not even solicit sales to accoutants who do not already own a computer, according to Partner Earl Bivins.

The second reason why so few programs are available is that the income tax is extremely complex, and the number of forms and schedules which any moderately well-off person must file each year is also large. If you simply itemize your return, you have to file a Form 1040, Schedules B and A. If you have children and take a child-care credit, that's another form, Form 2441. If you figure your own tax rate instead

of using the tax tables, that's Schedule TC. Taking expenses as an employee requires Form 2106.

Income-tax programs are also unavailable because integrating the figures on the most common forms and schedules, and carrying results back to the proper places on Form 1040 is not an easy programming task. It requires the close cooperation of talented tax professionals and talented programmers.

The tax law also changes every year. For the third time since 1976 the federal tax law has been significantly changed. Since the Internal Revenue Service never finalizes the changes until late October or early November, programmers find it very difficult to modify the income-tax software and get it running perfectly before the tax season begins on January 1.

Apple Computer, for example, issued a "Tax Planner" package in 1980 for the 1979 tax year, but did not perfect it and get it to market until half way through the tax season. It is not doing a similar program for 1981.

Although these difficulties prevent many software houses from getting into the tax-software business, a few have ventured boldly forth with surprisingly good results. Those few available tax programs offer a variety of approaches to tax planning and preparation. For example, Contract Services Associates, CPAids and Howard Software Services primarily serve income-tax preparation professionals with programs that prepare complete returns, including a number of forms and schedules.

Aardvark Software offers an income-tax planning package that allows an investor or accountant to consider various investment and income alternatives and their tax consequences. By using "gross" numbers or totals and not necessarily actual figures, one can study the effects of changes and consider the answers to "what if" questions. You can't do more than basic Form 1040s with this package.

Another approach

Micromatic Programming Company takes a third approach. Its package was originally designed to help fill out an individual income-tax return. For 1981 the company has upgraded its software so that tax preparers can use it for Forms 1040 and short-form 1040A.

At the state and local level, E-Z Tax Computer Systems in Monsey, N.Y., represents a good example of how smaller software houses face tax season. E-Z's State Income Tax Programs integrate with CPAids' Master Tax and General Ledger II. Because both New York State and New Jersey tax forms take most of their information from the federal Form 1040, the computer automatically calculates most of the state tax results with little help from the user.

Preparation problems

Deciding among tax software may be difficult unless you study each package and determine which best fits your business needs. None of these packages is perfect. None handles every schedule and every form, although the "big three"—Contract Services, CPAids and HowardSoft—add new forms and schedules each year.

When reviewing these packages, analyze your tax return to determine which forms and schedules you use most often. Then refer to the attached table to find out which package processes which forms and schedules.

For example, perhaps your firm has a large number of retired clients, and you fill out a lot of Schedules R & RP for retired persons. Only HowardSoft and CPAids include that schedule in their packages. If you do returns for many families with children and you use a lot of Form 2441 for child-care expenses and tax credit, it is important to note that only Contract Services includes that form in its package.

After reviewing the options, what do you do if a package you buy doesn't process a form or schedule you use? You simply go back to pencil and paper and insert the results on the Form 1040. If you mainly do complicated returns for wealthy individuals, you may have to do a few esoteric forms by hand. If your business is concentrated on individuals, families, the self-employed and small-businesses, the three main packages should handle 90 percent of your requirements. Micromatic and Aardvark can easily handle the routine Form 1040 and 1040A business.

Printing pains

If choosing a good package wasn't hard enough, the IRS has tossed in a curve that seriously complicates using computers to prepare tax returns. You should expect the greatest savings of time and clerical costs when the computer automatically prints out completed forms and returns. Thanks to the IRS, it's not that easy.

The IRS has strict rules on how tax returns can be prepared by computer. The strictest rule and the biggest problem is that all Forms 1040 must be submitted on a preprinted form.It sets strict formats by which the remaining forms and schedules must be printed. The IRS also requires lined or barred computer paper for the schedules and forms. Contract Services, CPAids and HowardSoft all include print routines that meet these IRS formatting requirements.

To alleviate this problem you could print one Form 1040, and then change the paper and print the remaining forms and schedules with a tractor-feed attachment. If you or

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your clerks do change paper, and remove and put back the tractor mechanism every time you print a return, you will lose much of your time and cost savings. Fortunately, software houses have devised acceptable ways to remedy this drawback.

Contract Services, for example, describes four ways to carry out the printing process. HowardSoft identifies a fifth. The company advises you to choose the method that best fits your office operations. First, if you have a photocopier and use it frequently, you may favor using overlays. You load the printer with fan-fold blank paper, and the printer prints the figures for the Form 1040 onto the blank paper in the appropriate locations. You then place a transparent overlay copy of the Form 1040 over the printout and run it through your copier. Contract Services says that half of its several thousand customers use this method.

Second, if you don't mind the expense, you may want to use two printers, one for batched 1040s and one for supporting forms and schedules. You may need special cables and hook-ups to accomplish this, and it may be too expensive for small offices. If your firm does hundreds of returns a year, however, it may be a good idea because of the time savings and the recouped copying costs.

If you have a small office but no copier, you can also feed one sheet at a time using snap-out forms with carbon inserts for the Form 1040 and blank paper. This is best if you intend to do a complete return with supporting schedules and forms at one sitting.

The fourth printing method involves a long, laborious process. Sheets of paper are inserted in the printer one at a time, and the printing parameters are changed for each run. Perhaps someday the IRS will see the folly of its requirements in a day of high-speed printers and change the rules, but it may not be soon.

HowardSoft also notes that preprinted, tractor-fed, continuous Form 1040s are available from office and paper suppliers. This last printing method allows you to batch-print all of the 1040s at once, and then do schedules and forms separately, but you cannot complete one return at a time.

Seven packages

When you have decided which printing method is best for your business, you must then decide which package meets your requirements. The programs discussed below have not been finalized for 1982. They were not complete by mid-October, and all discussions of manuals and actual program operations are based on 1981 packages. The new features for 1982 are discussed as described by the software houses themselves.

Aardvark Software's **Individual Tax Plan** is a sophisticated federal income-tax planning program for the Apple II Plus or the Western Digital Microengine with Pascal. Written in Pascal, it can be used with the Apple II Plus with the Language System, or Apple Pascal. It has a versatile format which allows you to study five alternatives at a time, and leads you through a complete Form 1040 line by line. Rather than simply stepping through the form, you can use a set of commands to go to any line at any time on the Form 1040. You can go from line nine to line 68 and back, for example, or use forward and backward commands to step line by line. Up and down commands let you move within lines in any of the five alternatives.

Although this feature is useful, the program's VisiCalc-like features are even more so. With one-letter commands you can increase the amount of an alternative with compound or simple interest, or add equal increments to a base figure (add $10,000 to $20,000, etc. for four more years, for example).

Like the other tax programs, Aardvark's package produces automatic computations for federal-tax liability, income averaging, maximum tax on earned income, minimum and alternative minimum taxes, capital loss and gains, etc.

It took just a few minutes to follow the examples given in the high-quality users manual, and to produce accurate results with simple figures. The manual is well-written and easy to understand, even for a non-accountant. Aardvark also includes very clear photos of the actual video screens in the order they would appear, with the results of using the commands.

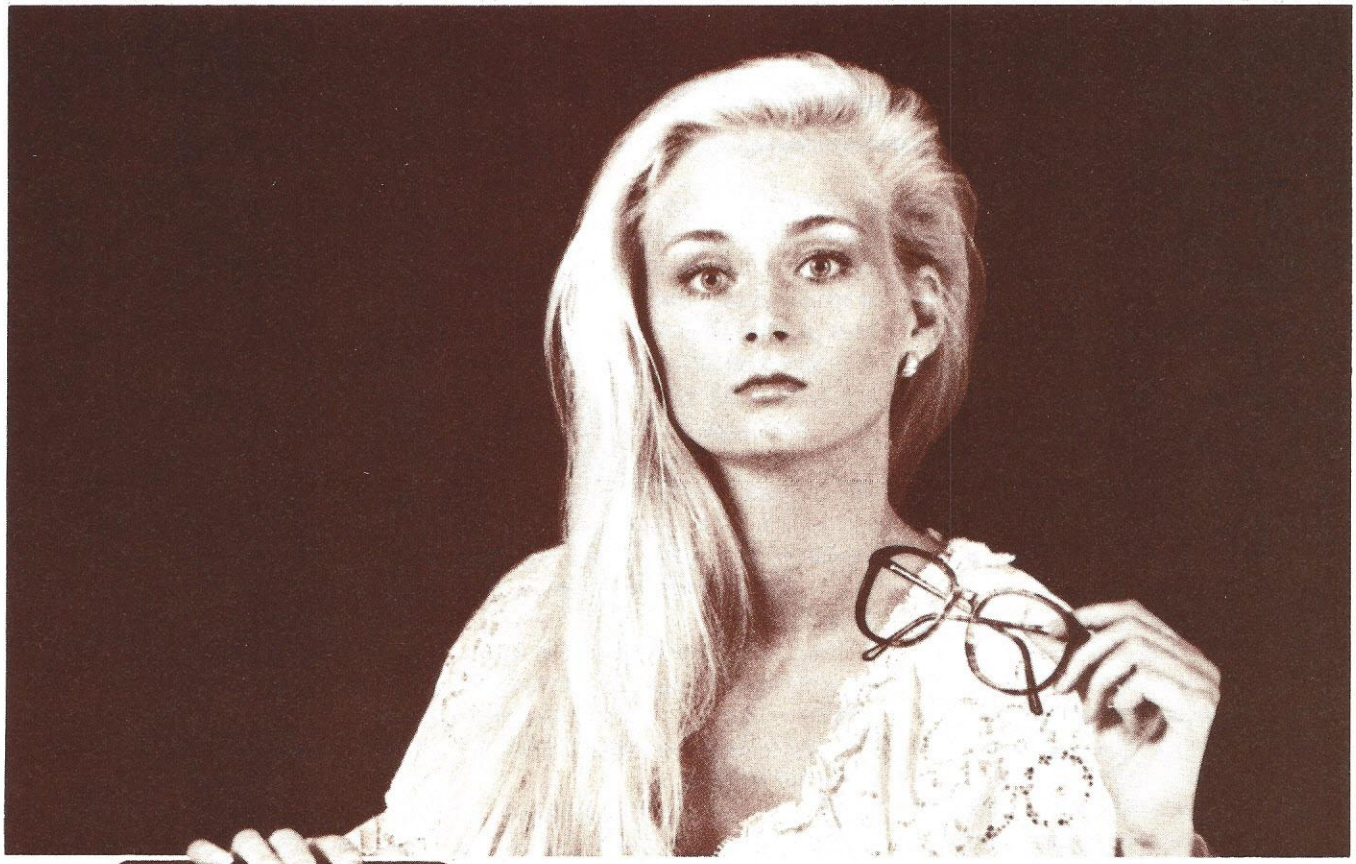
As a tax-planning tool, this package does not print forms and schedules, but does print the results with all of the alternatives side by side. It deals only with gross totals, not the separate calculations required to get them. The results from the preferred alternative can be easily transferred by hand to the Form 1040 and other forms and schedules.

For 1981, Aardvark has added several new computational functions which allow you to do even more sophisticated analyses while using the package to complete the basic tax forms.

If you are a financial or tax advisor, this package can be a handy, though limited tool to accomplish planning objectives for your clients with more complex tax problems.

Contract Services Associates' **Professional Tax System** is one of the best and most complete packages available. When the 1982 version is available, it will be completely updated with all of the 1981 changes, and will include several new features.

These new features include "QWIKTAX," a fast tax calculator



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using basic information; "Total W-2s," a utility program that adds up and carries all W-2 form totals to the 1040; and Client Billing, a self-explanatory utility program. Also included are four new schedules, including Forms 2441, 3468, 5695 and 4797 which carry their results to the 1040; and a feature that counts the number of returns you've completed.

This system, designed for any of the TRS-80 models, is the most extensive of any available package with more than 500k of program code. It has been divided into separate program modules, with Form 1040 and Schedule A the base program. You have to buy other modules to get other schedules and forms, and run them one at a time.

Info transferred

The base module is structured so that all information from any form or schedule is stored in memory. It is then transferred to the appropriate line on Form 1040 when the base module is again placed in the system. This works very quickly, and eliminates a lot of troublesome data re-entry. It will also lead you through the 1040, and take you to the sections or parts you need to complete to get net results.

For example, on the income summary it asks for "adjustments to income." If you answer yes, the program will automatically go to lines 23–29 for the proper figures. At the end, it will calculate the results and post them in line 31. If you answer no to the adjustments question, it will compute line 31.

This calculating speed is the main advantage of any tax program. This program will do an income averaging Schedule G form in 3 to 8 seconds, depending on its complexity. As any tax preparer knows, using a calculator to do the same thing is rough, says Contract Services' Bivins.

Contract Services' manual is written in a breezy style, and for the most part, avoids computer jargon. It does assume some knowledge of how a TRS-80 works and how its disk stores data in "grans." (Grans are groups of bytes of a specific size.) Although its program code is the most extensive, its manual does not contain enough step-by-step information, and its narrative style would be somewhat more difficult for a clerical staff member to use than for others.

This style does not detract from the obvious professional competency with which the program was written, and it does not detract from its powerful features.

CPAids' **Master Tax** program is probably the best-known tax-preparation program. It includes the largest number of forms and schedules of any package, although it does not have a few which its competitors provide.

For 1982, CPAids is the first to add the Corporate 1120 program to its line. It includes pages 1–4 of the Form, schedule D, forms 3468, 4797, 4874 and 5884. It features a new screen formatter with cursor control, and stops incorrect entries with extensive error trapping.

The 1981 package and manual were reviewed. In addition to automatic calculations of the information given, the program chooses the best alternatives for employee business use of a car, sales-tax deductions, itemized deductions or zero-bracket amounts and the best tax-calculation method. It carries medical-percentage limitations forward, earned-income credits, city/state tax to Schedule A, dividend exclusions and capital gains, depreciation to three schedules and two forms, installment sales, etc. It also stores historical information about each client on disks for editing or for next year's computation.

The CPAids package is structured in a helpful way. It starts with the Form 1040 into which you enter basic information such as names, statuses and exemptions. Depending on your clients' figures, it will then branch to Schedule B, return to the 1040, and go back and forth between various schedules, forms and the 1040 in sequence, with the appropriate lines on the schedules and forms carried back to the 1040. This structure generally follows the structure of the 1040, and the schedules and forms can be used or overridden as required.

CPAids advises using its "input forms" to prepare the forms and schedules before the data are entered. The company charges $50 for 50 complete sets of forms and schedules. This step is unnecessary with both Contract Services' and HowardSoft packages.

Good documentation

CPAids does have a very good manual that leads the user step by step through all of the forms and schedules it includes. The instructions are on the right-hand page and the actual form is presented on the left-hand page. The same information, as it appears on the video screen, is presented below the actual form. An instruction line is noted in the appropriate space on the corresponding form or schedule. This approach makes the program very easy to use, if somewhat tedious, but leaves no stones unturned. It assumes that people unfamiliar with both tax-return preparation and computer operations will be using the program.

Finally, the Master Tax program integrates to CPAids General Ledger II program through an interface with Schedule C. It also maintains depreciation all year with a program included in the package. Depreciation figures can then be carried forward to schedules C, E and F, and to Forms 3468 and 4255. In the Cor-

TAX PREPARATION FEATURES TABLE

Feature/Company	AARDVARK SOFTWARE[1]	SERVICE ASSOCIATES	CONTRACT	CPAIDS	E-Z TAX SOFTWARE[2]	SOFTWARE SERVICES	HOWARD PROGRAMMING	MICROMATIC	MICROTAX
FORM 1040	●	●	●		●	●	●		
SCHEDULES:									
A	●	●	●		●	● [3]	●		
B	●	●	●		●	●	●		
C	●	●	●		●	●	●		
D	●	●	●		●	●	●		
E		●	●		●		●		
F		●	●		●		●		
G	●	●	●		●		●		
R&RP	●		●		●		●		
SE	●	●	●		●		●		
ES			●				●		
FORMS: K, K1							●		
1065							●		
1116			●						
2106		●	●		●		●		
2119			●		●		●		
2210		●	●		●		●		
2440							●		
2441		●					●		
3468		●	●		●		●		
3903		●					●		
4136			●						
4137									●
4255			●						
4562					●		●		
4625		●	●		●		●		
4684									●
4726		●	●		●		●		
4797		●	●		●		●		
4874			●						
4972			●						●
5695		●	●		●		●		
5884			●						
6251		●	●		●		●		
6252			●						●
6765									●
PRINTING OPTIONS:									
Preprinted forms		●	●	●	●	●	●		●
Overlays		●	●	●	●	●			●
Computer-generated forms	●	●	●	●	●	●			●
Federal or state forms		●	●	●	●	● [4]			●
Automatic Calculations	●	●	●	●	●	●			●
Automatic Distribution	●	●	●	●	●	●			●
Alternate tax	●	●	●	●	●				●
General Ledger integration			●						
Pro-forma system									●

1 — Tax planning only, not directly useful for preparation of tax returns.
2 — New York, New Jersey state returns only; features at bottom of table.
3 — Features for Micromatic's long version of its TAX-SAVER program.
4 — Not known at presstime.

porate 1120 package, general-ledger data can be brought from the GL package to the income and balance-sheet sections.

Howard Software Services' **Tax Preparer** is a very inexpensive but useful tax-return program for small offices. It takes a tax preparer through the Form 1040 line by line, and includes a useful scrolling function that allows you to move forward through the program. The scrolling function also automatically repeats all calculations and corrects the figures if you made any editing changes.

The program's step-by-step structure is easy to use. It has a built-in capability for editing each line, and allows you to skip whole sections of each form with one keystroke, a good feature for filling out supplemental forms and schedules.

1040-like

The structure is based on the setup of the 1040, and you must fill in the appropriate spaces on the 1040 for the supporting schedules and forms and calculations to be correct. You fill out the 1040 line by line until you come to a line on which a result from a different form or schedule is required. You then go to the end of the 1040, remembering the form number, and return to the menu. You choose the correct form or schedule on the menu and fill it out. After it has been completed, the results will automatically be posted in the correct line on the 1040.

The manual is written in a narrative style. Although it is professionally done, it is harder to use, requiring more reading and study than a step-by-step method, especially when you want to refer to a specific item you've forgotten or a mistake you need to correct. It does, however, take you through a sample return first, and then advises you to fill out your own return before

continued on page 76

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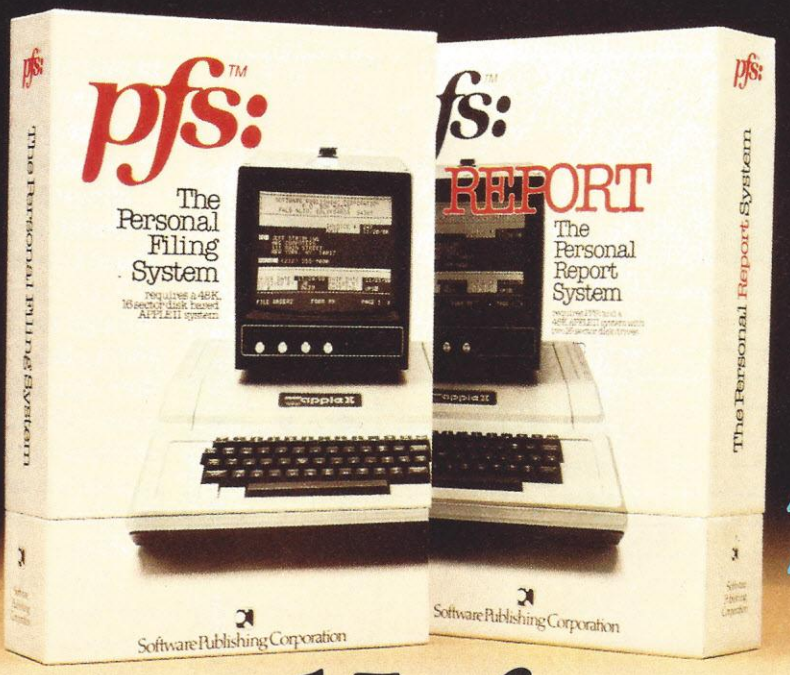

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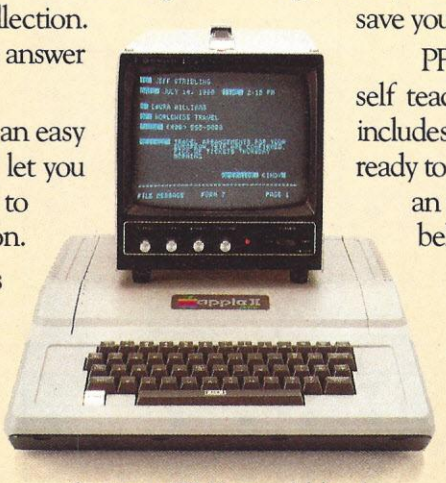

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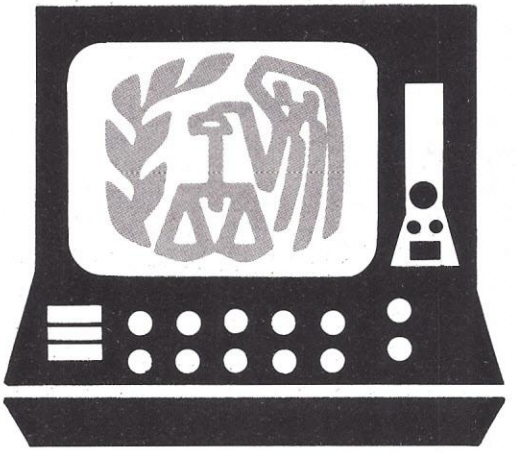
E.J. Neiburger and Cecilia Wessner

Voice of the IRS: can computers be deducted?



Instead of taking the cost of your personal computer as a loss at tax time, help defray those expenses with new tax-relief options

The decision to invest in a personal computer can bring financial worry lines to the brow of even the most liberal equipment buyer. There is the initial cost of the system to be considered. Software prices must be weighed, and finally, taxes on the system must be paid. However, relief for these financial considerations is forthcoming in the form of tax deductions.

Some people consider tax deductions as "loop holes" or ways of escaping the payment of one's fair share. Knowledgeable people, however, are realizing that a loop hole is really a "tax relief," and it is one's right to benefit from legal tax deductions.

One reason to take advantage of tax-relief programs is the high cost of the computers and software. Not only does a person pay $1500 for a personal computer, but, depending on his tax bracket, he has to earn an additional $500–700 to cover the taxes on that $1500. The total equivalent cost is then $2000 to $2200, not including sales tax. Wouldn't it be more economical to be able to deduct the full price of a personal computer?

There is a way that the cost of a computer, software and support systems (for example, electricity and insurance) needed for operation can be deducted. All that is required is an itemized tax return and fulfillment of the deductibility requirements of the IRS.

Most business people know that the majority of expenses related to running a business (income) are tax deductible. But what about the home-computer user who does not own his own business? Can he deduct his computer system?

If the home user is a teacher, clerk or is employed in just about any occupation, there is a possibility of deducting the cost of the computer on annual income taxes.

The Economic Recovery Tax Act, passed on August 13, 1981 does not permit a full write-off of computer equipment purchased in 1981. However, these computers are eligible for the new method of depreciation, called the "Accelerated Cost Recovery System."

Under this new method, computers are depreciated over a five-year period, and if the equipment is used for research and development, it can be depreciated over a three-year period. For computers purchased in 1981–1984 covered under the five-year depreciation method, the first year's depreciation rate is 15 percent of the total cost. For the second year, the depreciation is 22 percent, and for the last three years the depreciation rate is 21 percent. Thus, the entire cost of the system is deducted over the five-year period.

This new depreciation schedule makes it possible to recover the cost of the computer system more quickly than was possible under the old laws. Says Tony Bombadiere, a spokesman for the Internal Revenue Service, "The reason why we gave a shorter depreciation time-span is to give the user an economic advantage in recovering the cost of the equipment. Before, depreciation was based on the economic life of an asset. If the economic life was 20 or 30 years, you had to depreciate over that amount of years. Now the time frame is set by law and there's no question about whether the equipment has a 20- or 30-year life."

Another provision of the new laws provides for the deduction of the first $5000 of business equipment purchased in 1982 and 1983. Thus, computer systems purchased during these years could be fully expensed in the same year, but no investment credit is permitted on these purchases. If the cost of the equipment is greater than the deduction allowed, the excess cost

is eligible for the new depreciation method.

These laws imply that if you have a trade or business—in other words, you earn money—and a personal computer helps in that trade, then it may be deducted. First, however, the computer's use in your occupation must be established.

What to deduct?

Before preparing the actual tax return, you must consider what deductions are permitted by the IRS. For example, deductions such as heat, electricity and facility maintenance can only be claimed if you are self-employed and your home is your principal place of business; or, if you are an employee and are required to work at home because your employer cannot provide you with adequate working space. Also, Bombadiere says, "In order to qualify for the home deduction, the room where the equipment is housed must be used totally and exclusively for business. That's the only way that home deductions can be made." However, the actual computer may be deducted by an employee who chooses to work at home, provided the equipment is used for business reasons. If a portion of your residence is deducted for computer support, a copy of a photo of the computer enclosed with your tax form would be helpful.

When deciding what other items may be claimed, note that new skills do not qualify for a deduction (for example, a plumber learning to become a programmer). But, deductions for the maintenance of one's skills (for example, a teacher learning a math-education program), do qualify. Also, substantial sales taxes are often an added source of deduction, especially on a large purchase.

Another qualification the IRS takes into consideration is the incidence of use—how much time you actually use the computer for your business. Although, as Bombadiere states, "The computer is like a Xerox machine in the office. We don't say you have to use it four hours a day or one hour a day. If it's used for business purposes it's deductible." However, using your computer as an adding machine as a once a year income-tax calculator would probably not allow a deduction. The key is using your personal computer as a business tool, which implies fairly constant use.

For the question of deducting telephone (modem) support of a computer, it is well advised to consult a knowledgeable accountant.

The tax forms

After giving serious thought to the deductions for which you may be eligible, the time comes when tax forms must be filed. Depending upon whether you are self-employed or employed by another, different forms are used.

If you are self-employed and use a computer for your work, all computer-related deductions are listed on Schedule C, a profit and loss statement (expenses are deducted from income). On this form, deductions such as heat, electricity and home (office) maintenance are allowed.

For people who are required to work at home because their employer has insufficient space, home deductions are also permitted. However, Form 2106 must be used to allow a listing of these employee-related business expenses.

Finally, if you are an employee and choose to use your personal computer at home, Form 2106 is also used. Thus, you can deduct the computer, printer, etc., as long as you can establish the use of this equipment in your occupation.

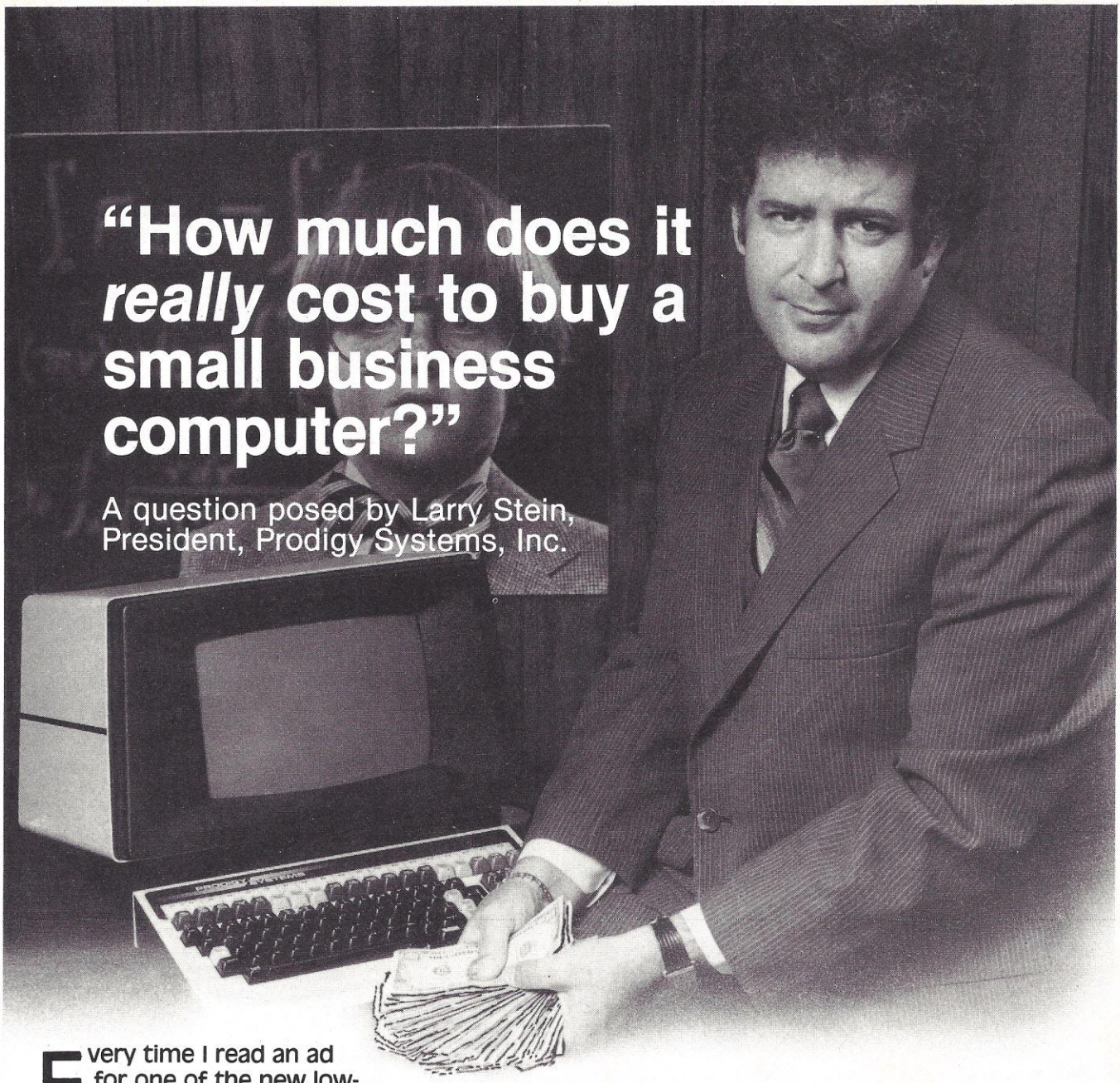
Should the IRS question your deductions (and it can question any deduction), you will probably receive a letter asking for further explanation. This is your chance to explain how the computer helps you make money in your existing occupation. Should that not be sufficient, then a personal meeting and frank discussion with IRS personnel may be necessary.

Me, audited?

Often a radical change in deductions can flag a tax audit. A waitress deducting a $5000 personal computer may present an opportunity for a second look by the IRS. To reduce the chance for an audit, enclose a brief description with your return of what the computer does for your occupation and how it helps increase or maintain your present skills and income. As an individual, your financial activities are unique. Considering this fact, a similar deduction claimed by two people may be accepted by the IRS in one case, and rejected in another. On the matter of deductibility of computers, it is best to consult your tax advisor for your own individual situation rather than take your computer cost as a loss.

One way to help your tax advisor is knowing some of the software programs that can aid you in qualifying for computer-related income-tax deductions. For example, anyone can qualify by using checkbook and income-tax programs, provided that they are used fairly often and help the user in his business. Also, mailing-list and mileage programs can help salesmen; typing tutorials, appointment scheduling and word-processing programs can help secretaries; and student grade scores and class-roster software can help teachers.

In addition to these aids, phone-directory programs, inventory, calculation software, data-base management programs, payroll, accounts receivable and accounts payable software can also be used to help in qualifying for computer-related tax relief.



"How much does it *really* cost to buy a small business computer?"

A question posed by Larry Stein, President, Prodigy Systems, Inc.

Every time I read an ad for one of the new low-cost business computers, I cringe. Why? Because I see "respectable" manufacturers marketing computers like automobiles. They play games by advertising low prices, but they don't tell you about all the extras you have to add to make the system work. Especially the biggest extra of all — software. Without software a computer is worthless. Yet, most manufacturers like to keep the software issue hidden in the closet. Mostly because it adds considerable cost to their "low-priced" computers. But you can't talk about the cost of a computer without including the cost of software.

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CIRCLE 24

Richard Stern

LEISURE COMPUTING

Another computer advantage— cutting Christmas costs

Curb those cash-and-credit holiday blues without sacrificing the spirit of the season

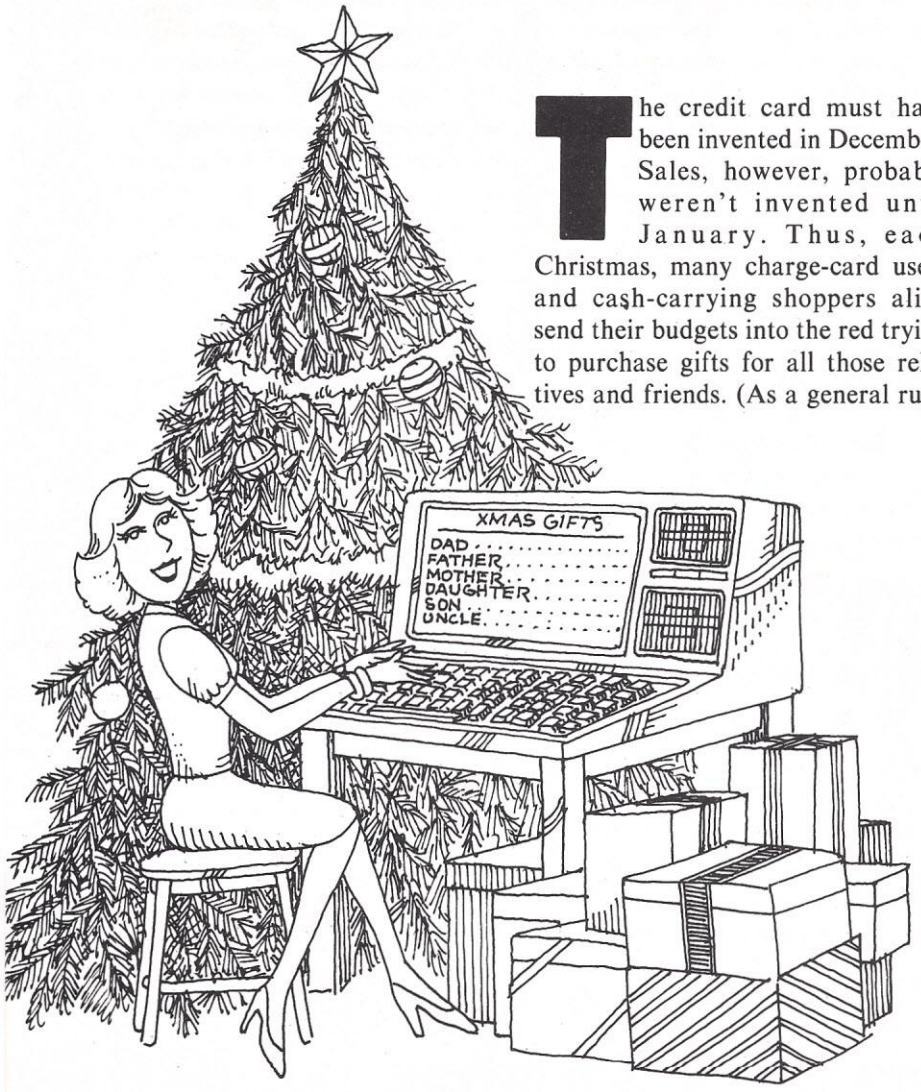


ILLUSTRATION BY FRANK MARCIULIANO

The credit card must have been invented in December. Sales, however, probably weren't invented until January. Thus, each Christmas, many charge-card users and cash-carrying shoppers alike send their budgets into the red trying to purchase gifts for all those relatives and friends. (As a general rule, savings are not inherent in the holiday season.) And, what's more, the parties themselves tend toward the extravagant, for what's a Christmas party without the elaborate trimmings? There must be a better way.

And a better way there is. Using a party-planning and gift-giving program, these staples of the season don't have to put a damper on the holiday mood.

This program, written for a TRS-80 Model I, alleviates the "every relative and friend gets a gift" problem by randomly drawing names so that each person receives only one gift from one person each year—a big economic advantage. The program also alleviates the problem of being assigned your own name, receiving two presents the same year, or receiving a gift from the same person for two consecutive years. (Who wants two pairs of imitation alligator earmuffs anyway?) These solutions are possible using BASIC's random reseeder and random-number generator.

Using BASIC, it is also mathematically possible to plan for as many years into the future as one less the number of people in the gift exchange. However, the larger the

number of people in the exchange, the longer it takes to run the program. For a large group, it is not uncommon for the computer to take hours to make a selection. Thus, a machine-language program is needed which executes an instruction in microseconds, rather than in milliseconds like the BASIC program.

Mathematically, what is required is to create an N by N-1 array by random choice of elements, in which each row contains all numbers from 1 to N, randomly distributed, with no repeated numbers. (This prevents someone from receiving two gifts.) The columns also contain all the numbers from 1 to N, randomly distributed, again with no repeated numbers. (This prevents someone from giving a gift to a person to whom he has given the previous year.) However, column 1 must not contain the number 1 (no one gives a gift to himself), and thus there are only N-1 numbers in each column.

The BASIC portion of the program makes use of the array generated by the machine-language program to make decisions concerning party planning.

All in the planning

The party-planning program has five sections. The first section, inspired by the original gift-giving problem, will decide on an exchange of presents among a large group of people; that is, it creates the holiday gift-exchange listing.

Presently, the maximum number of people that can be handled within the program is 25. This number is limited only by the DIM statements in line 30. The limit may be changed at any time and depends only on the amount of core memory within the computer system. For large groups of people, the CLEAR 1000 in the same line may also have to be increased.

In running this section of the program, you are prompted to enter the names of the people in your exchange, the year that you wish the exchange to begin, and the number of years into the future for which you wish the computer to create a listing. The greater the number of years requested, the longer it will take to create the array. For a large exchange, such as 20 persons, choosing names for 19 years (the maximum allowed for 20 people), might take 10–15 minutes. The array is typically formed in seconds.

Use imagination

When section one of the original program was written, it became apparent that the special array could be used for additional types of party planning, and thus, sections two through five were conceived.

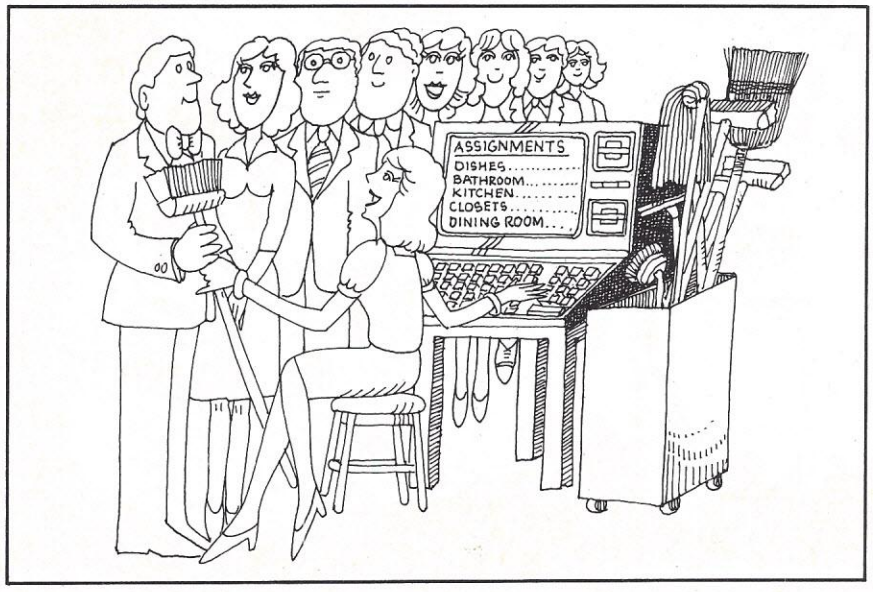
Section two uses the array to generate the elements of a potluck dinner—a party in which guests are asked to bring items of food to someone's home. The array, which in this case contains only one row, is modified (and for sections three through five as well) in that it becomes possible for column number 1 to contain a 1, column number 2 to contain a 2, etc. This modification eliminates the constraint that person number 1 will not be allowed to be assigned item number 1.

When running this section of the program, you will be prompted to enter the names of the guests and then the items of food that you want them to bring. You may have less items than guests, but not more. If two guests are asked to bring the same food (such as frog's legs), then it must be entered twice.

A progressive party is planned in section three. A progressive party is one in which all the guests assemble at someone's home for the first course of a meal and then move on to a new home for the second course.

When running this section, you will be prompted to enter the courses in order (such as soup, salad, fish, etc.) and then the names of the guests. You need at least as many guests as there are courses, but you may have more. The computer then decides who serves which course, relieving the planner of this obligation.

Section four plans the rotation of homes for a bridge or poker party. After the computer prompts for the names of guests, it selects the order of the meetings for as far into the future as is mathematically possible. It should be noted that when the array



is modified to remove the constraint that the number 1 cannot appear in column 1, etc., the number of possible rows increases from N-1 to N. Thus, for eight people the computer will set up 64 meetings (8^2).

Finally, the computer decides the distribution of the party clean-up chores, which takes place in section five. Any number of people may be entered and any number of chores may be listed. Because there are usually more chores than people, some individuals are assigned more than one chore. To insure that the first person entered does not always perform the maximum number of chores, the names are jumbled as are the chores. The program then assigns the chores to these people.

Program notes

An analysis of the BASIC program shows that statements 10–310 introduce the program and establish the menu. Line 30 contains the CLEAR and DIM statements for the arrays, which may be expanded for large arrays and longer strings. For these arrays, it is important to define all numerical variables as integers in order to run the machine-language program.

Lines 1000–1350 are used in the Christmas-gift exchange, and lines 2000–2360 are used by the potluck-dinner section. The progressive-party section is contained in lines 3000–3350, while the bridge or poker party use lines 4000–4220. Finally, lines 5000–5320 decide on the clean-up chores.

Lines 50010–50030 create the flashing "Press Enter" prompt. Note that the ENTER key may be pressed at any time during the flashing cycle, even while the machine-language program is being loaded. Then, lines 50040–50070 create the flashing "PLEASE MAKE SELECTION" prompt.

In line 50080, the constraint that column 1 not contain the number 1, etc., is eliminated. The same line then calls the array-generating routine, and restores the routine to its original format which includes the constraint.

Lines 50090 and 50100 establish the initial conditions for the machine-language program to create the array. It is important to note that in these two lines, the order of presenting the variables and their definitions must not be changed for the machine-language program to run correctly. Finally, lines 60000–60270 load the machine-language program while the computer is displaying its description.

VARIABLES IN THE BASIC PROGRAM

A$(25)	- Lists of guest names, etc.
B(25,25)	- Array generated by machine-language program
B$(25)	- Lists of items, etc.
CH	- Chore number
CO	- Course number
D$	- Holds INKEY$ selection
I	- Part of FOR-NEXT statement for subscripted variable
IT	- Item number
J	- Part of FOR-NEXT statement or totals count
K	- Part of page-scrolling routine
N	- Counts item, guests, etc., and equals the number of columns in array
S	- Selection number, numerical
S$	- Selection number, string
ST	- Part of page-scrolling routine
T	- Part of FOR-NEXT statement used in timing video displays
TE	- Temporarily holds value of N
V	- Part of FOR-NEXT statement for subscripted variable
W	- Part of FOR-NEXT statement
Y	- Counts years, etc., and equals the number of rows in array
YE	- Year for first gift exchange
Z	- Dummy variable for user statement
Z(3)	- Holds variable for input to machine-language program

Impressive printout

The program was written for video display, but if the PRINT statement is changed to LPRINT in the following lines, the program is output on a line printer. Simply change lines 1260, 1290, 2290, 2310, 3270, 3280, 3300, 4140, 4150, 4180, 4200, 5240 and 5270. Thus, the '@NN' in lines 1260, 2290, 3270, 4140 and 5240 should be changed to 'TAB(NN).' For example, line 1260 should read LPRINTTAB(25), "CHRISTMAS"; YE:LPRINT.

It is also convenient to delete lines 1300, 1310, 2320, 3310, 4190 and 5290. In addition, delete the GOSUB50000 in line 4200. The printer display will also look more impressive if line 1330 is changed to YE=YE+1:LPRINT:LPRINT.

To change the 16k (32511 bytes) Level II version to a faster 32k disk version, the following changes must be made:

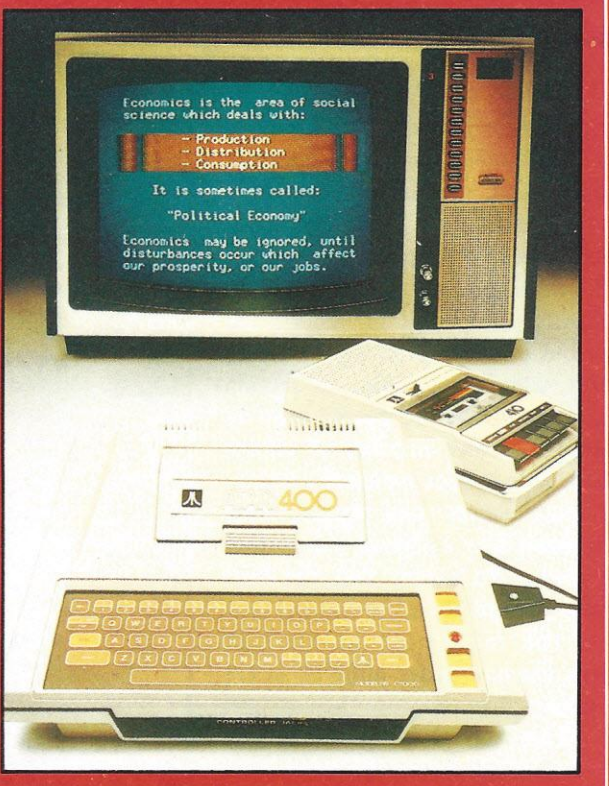
- Memory size=48895
- Line 50080 should read: POKE-16495,00:POKE-16494,OO: GOSUB 50090:POKE-16495, 40:POKE-16494,223: RETURN
- Line 60000 should read: FORI = -16640 to -16403:READJ
- Line 60020 should read: DEFUSR = $HBFOD
- Line 60060–60270: All DATA statements '127' should be changed to '191.' Do not change the '127' in line 60050.

Editor's note: The machine-language program is listed on page 141. There are a number of references available that will aid in understanding the operation of this program, one of which is James Farvour's work, Microsoft BASIC Decoded and Other Mysteries for the TRS-80.

continued on page 132

Holiday shoppers' guide

When the kids clamor for video games this Christmas, why not get a personal computer instead? Several manufacturers offer personal computers with a variety of software to get the whole family involved in games, calculations or problem solving.



The Atari 400

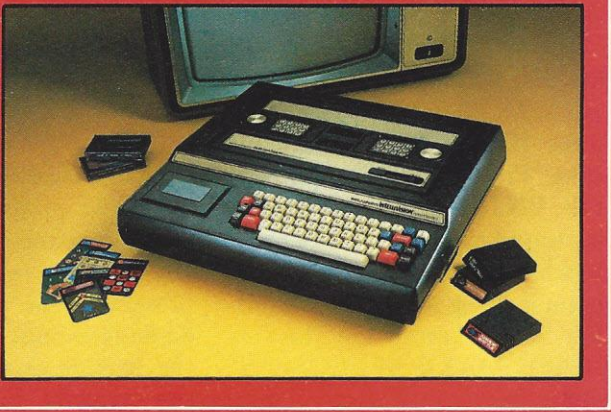
Personal computers are no longer only in the province of adults. Programs for game playing, creating music and learning state capitals keep children busy for hours. When this unit does get back into adult hands, it can help with investments, conversational French and calculating biorhythms.

The price is $399.

Intellivision by Mattel

To alleviate television tedium, Intellivision turns a color TV into a baseball field, a motor speedway or a war zone. Interested in furthering your children's education at home? This unit also has programs for education. Using the Keyboard Component, adults can get involved with personal finance, physical fitness or stock analysis programs.

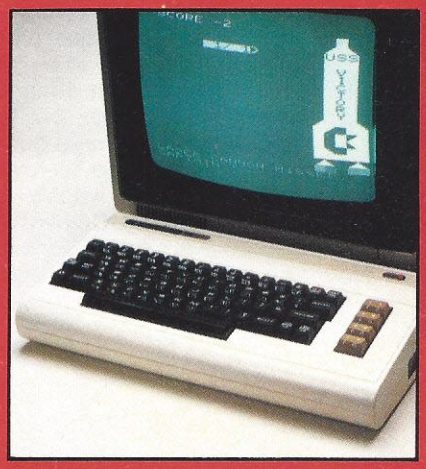
The price is $300.



The TI 99/4A

This personal computer easily handles a variety of home applications. There are programs for entertainment, personal finance, record-keeping and beginning grammar. Interested in variety? This unit provides music capability in stereo by hooking it up to a hi-fi system. A TV can act as a video monitor using a plug-in modulator, or monitors may be purchased for the system.

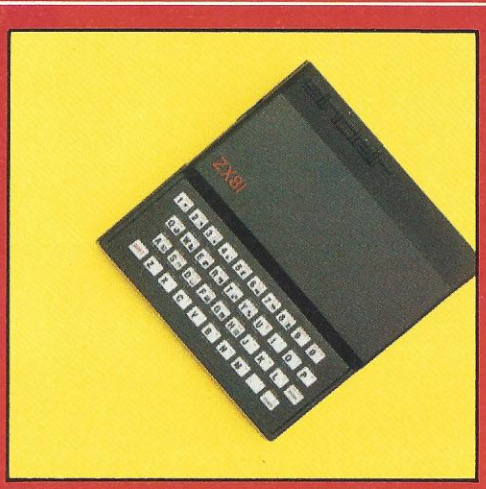
The price of the computer is $525 and the modulator is $50. The 10-inch color monitor is $375.



The Commodore VIC 20

The VIC 20 color personal computer has qualities that will intrigue all ages. Games, education and home-utility programs can help solve problems and perform calculations. Are you an aspiring musician? This computer won't give you top billing at Carnegie Hall, but you can explore your talents by creating sounds and songs.

The price is under $300.



The Sinclair ZX81

This unit is probably the smallest available with general-purpose capability. By plugging the ZX81 into a television set, users can brush up on math, spelling, and business and household management. When you're not busy with these programs, relax and play games. (That is, if you can get this computer away from the kids.)

The price is $149.95 completely assembled, or $99.95 in kit form.

KNOWLEDGE IS POWER

True when Sir Francis Bacon said it in 1597 at the dawn of the scientific age. And true a thousand times over in 1946, when the brilliant mathematician John Von Neumann supplied the key idea—the stored program—that made possible the modern computer.

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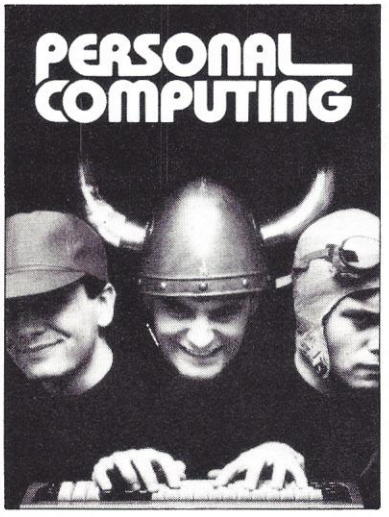

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Steven S. Berry

Progressive learning by computer

The "computer age" in education helps put students of all ages in control of their own learning

Two untold numbers of parents who had to struggle with memorizing multiplication tables, or who counted on fingers and toes to solve a math problem, the new "computer age" in elementary school education is a a puzzling phenomenon. How is it that some four-year-old children not only seem to understand, but apparently embrace and put into practical application the rudiments of geometry and algebra—years before such demands may actually be made of them in an ordinary school environment?

The answer is quite simple. No one ever told them that this was supposed to be difficult, or that it was advanced learning. They have discovered the basic principles involved, and have put them to use by using TI LOGO, a computer language designed for the TI 99/4 personal computer.

PHOTO BY KENNETH W. SCHROERS

TI LOGO creates computer-based environments in which students of all ages can take part in the concept of learning-without-teaching.

TI LOGO is based on the philosophy of education developed over a 12-year period by Dr. Seymour Papert and the staff of the Artificial Intelligence Laboratory at the Massachusetts Institute of Technology. LOGO offers a discovery-oriented approach to learning that not only attracts and holds young peoples' attention, but stimulates interest and gets them involved in the learning process.

At the heart of LOGO is the concept of creating computer-based environments in which the learning of mathematics and other subject areas can take place in a natural way through the process of exploration, trial and error and discovery. There are no right or wrong answers in LOGO—merely problems that need to be corrected and programs that need to be debugged.

Many of LOGO's concepts are based on the work and educational theories of the late Jean Piaget, the Swiss authority on child development. After five years of study with Piaget in Geneva, Papert came away very much impressed by Piaget's way of looking at children as the active builders of their own intellectual structures.

"To say that intellectual structures

are built by the learner rather than taught by the teacher does not mean that they are building from nothing," says Papert. "Like other builders, children appropriate materials they find about them, especially the models and metaphors suggested by the surrounding culture.

"For me, the most dramatic image of successful learning is the way children learn to talk. This learning contrasts with school learning in many ways, of which I think two are most important. First, it is highly successful. All children learn to speak the colloquial dialect spoken by those around them. Second, it has none of the technical paraphernalia of schooling. There is no curriculum, no set lesson times, no quizzes, no grades and no professional teacher. It is part of living. I call it 'learning-without teaching,' or Piagetial learning."

Teaching computers

This philosophy of learning-without-teaching has been applied in fundamental ways to the development of the LOGO computer language. As Paper says, "In most contemporary educational situations where children come into contact with computers, the computer is used to put the children through their paces, to provide feedback and to dispense information. The computer, in essence, programs the learning process.

"Our approach has been diametrically opposed to that. By striving to make the computer's processes as transparent as possible and creating activities in which children "teach" (program) computers via a procedural language like LOGO, we have aimed toward putting children in control of their own learning. In teaching the computer how to think, children explore how they themselves think."

To develop this learning approach, there was a cooperative effort between MIT and Texas Instruments. TI LOGO is a high-level language that allows young students to communicate with the computer using easy-to-understand, everyday language. They can draw geometric figures and designs on the screen, or experiment with lines and proportions. They can create animated "movies" with moving shapes. They can also create their own shapes, giving each the attributes of color, speed and direction.

These moving objects are made possible by using the color and graphics capability of the TI 99/4A personal computer. The TMS9918A Video Display Processor in the system allows up to 32 different "sprites" or shapes to be placed on the screen at one time.

The invisible space

A sprite is an invisible 16 x 16 space that can not be seen until it is given attributes that will allow it to have visible features. The user must first tell the sprite what shape it is to carry, and then set the color, the heading and the speed. It is possible to define any combination of sprites with the statement, TELL SPRITE (1 3 5 7 9), or all 32 sprites with, TELL :ALL.

TI LOGO has five sprites including a plane, a truck, a rocket, a ball and a box. Numbered one to five, these shapes can be incorporated in a procedure or the user can make his own shapes by entering MAKESHAPE, followed by an appropriate number (MAKESHAPE 6, for example). The 16 x 16 grid appears and the user proceeds to draw his shape using the arrow keys to move the cursor around the screen as desired.

Speed can be set from plus/minus 127, and headings can be set from 0 to 360. It is then possible to generate complex animated color movies that involve rockets taking off from a launch pad, planes flying over a landscape or whatever suits the imagination of the user.

For the youngsters to make use of the sprite capability, they must first teach the computer what to do and how to do it. They must make logical judgments as the procedure (or program) evolves, debug the procedure as necessary, and redefine the objective should the design or procedure require it. Since the students are in complete control of what the computer does, learning takes place naturally as the students explore the computer, discovering new methods of accomplishing their goal as they proceed.

The language is also structured so that preschool children can use the computer. Children as young as three-years old have become exposed to number and spatial relationships, decision-making processes and logical problem-solving techniques. As simple as these exercises are, the language also enables students to explore a succession of increasingly complex capabilities.

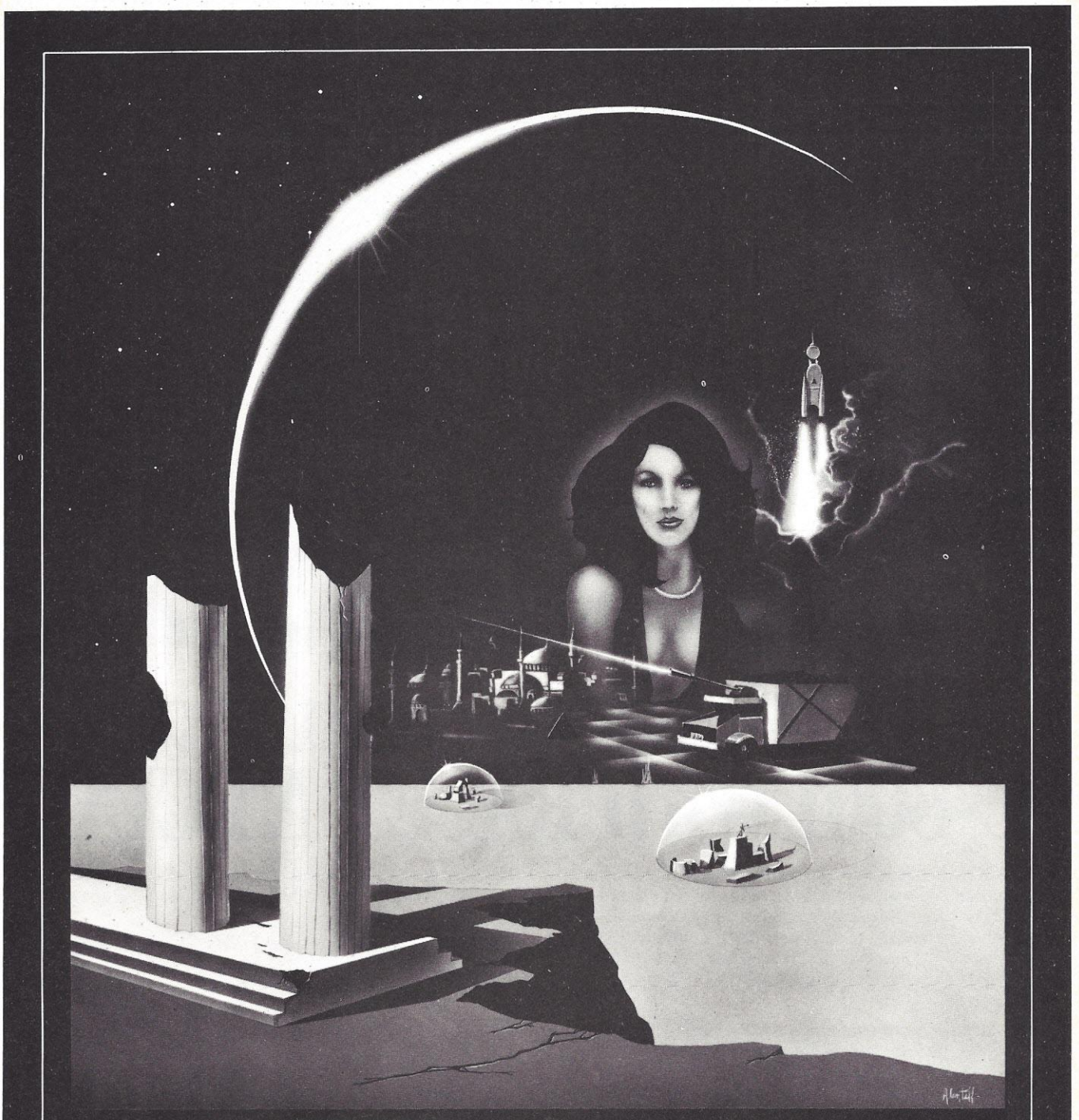
Rising self-esteem

The benefits of this approach to learning are many and varied. It can help the youngster learn to think in a logical fashion, since the computer must be given logical instructions. It can guide the student through a wide range of mathematical exercises, especially in the areas of geometry. Youngsters soon come to know the computer as a tool for communicating and for practical problem-solving.

Another less obvious benefit is the attitude children develop. The positive experiences the children create with the computer fosters a positive self-esteem. TI LOGO allows the student to progress in many directions at a self-paced rate, and it offers the opportunity for virtually unlimited creative expression.

TI LOGO was tested prior to its introduction at the Lamplighter School in Dallas, Texas, and in New

continued on page 94



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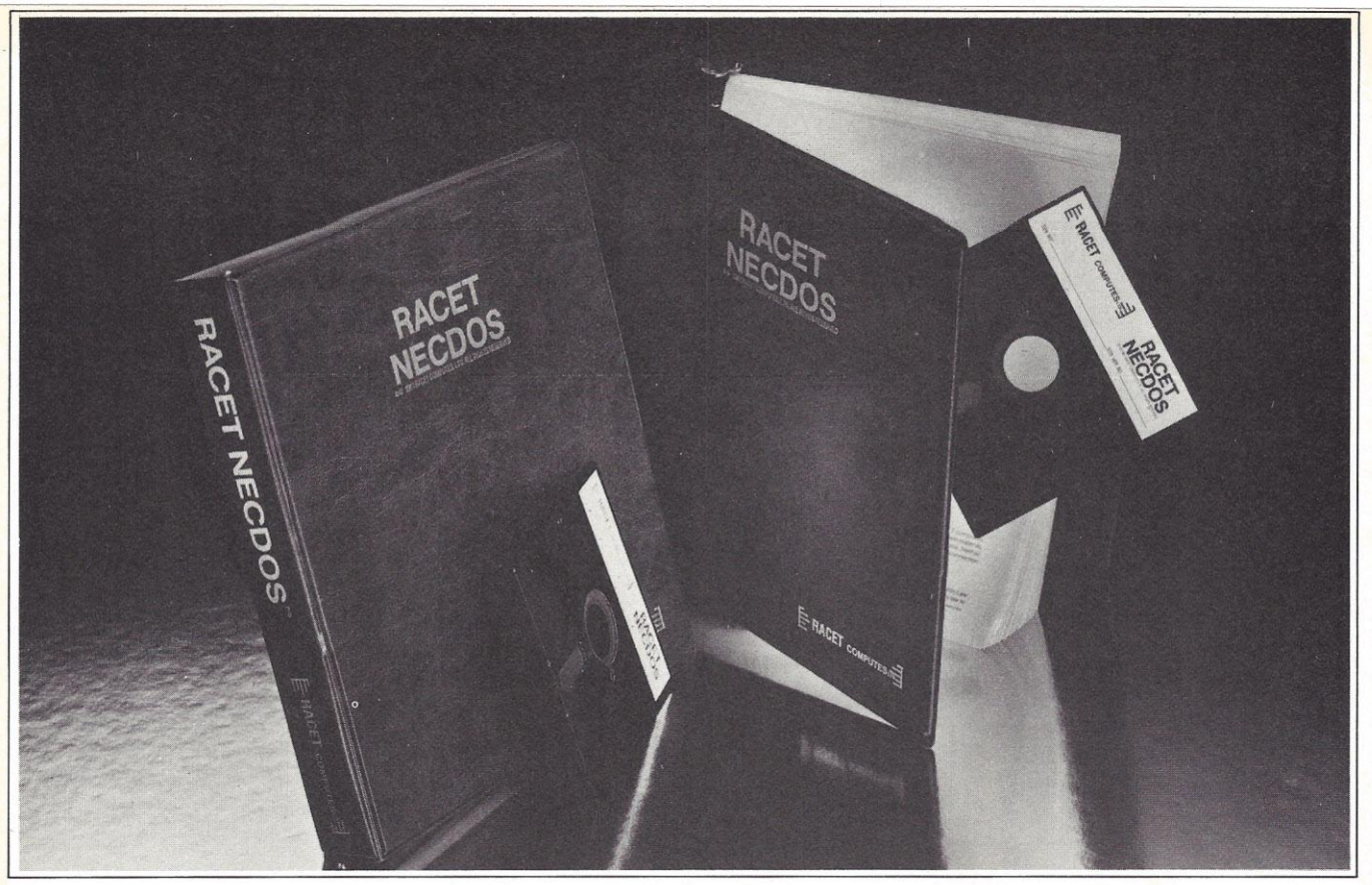

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RACET NECDOS does more for your PC-8001 than any other DOS. It's faster, more efficient and easier to use. It's upward compatible with the disk operating system supplied by NEC. It's loaded with extra features to let you stretch the limits of your system. It's only $175, and what's more, BASIC-based TRS-80** software can be converted to RACET NECDOS via a set of convert programs.

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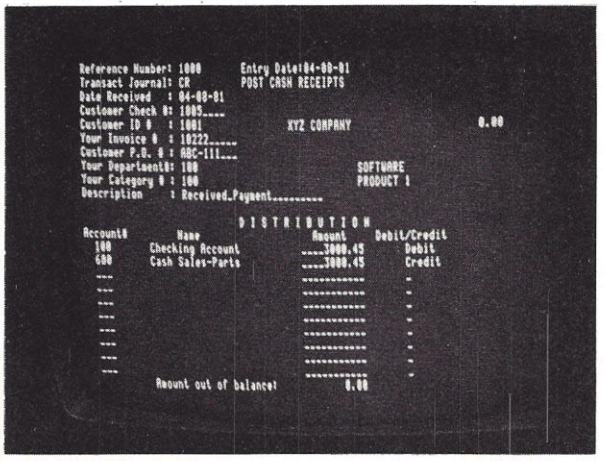

Typical screen format - actual photograph.

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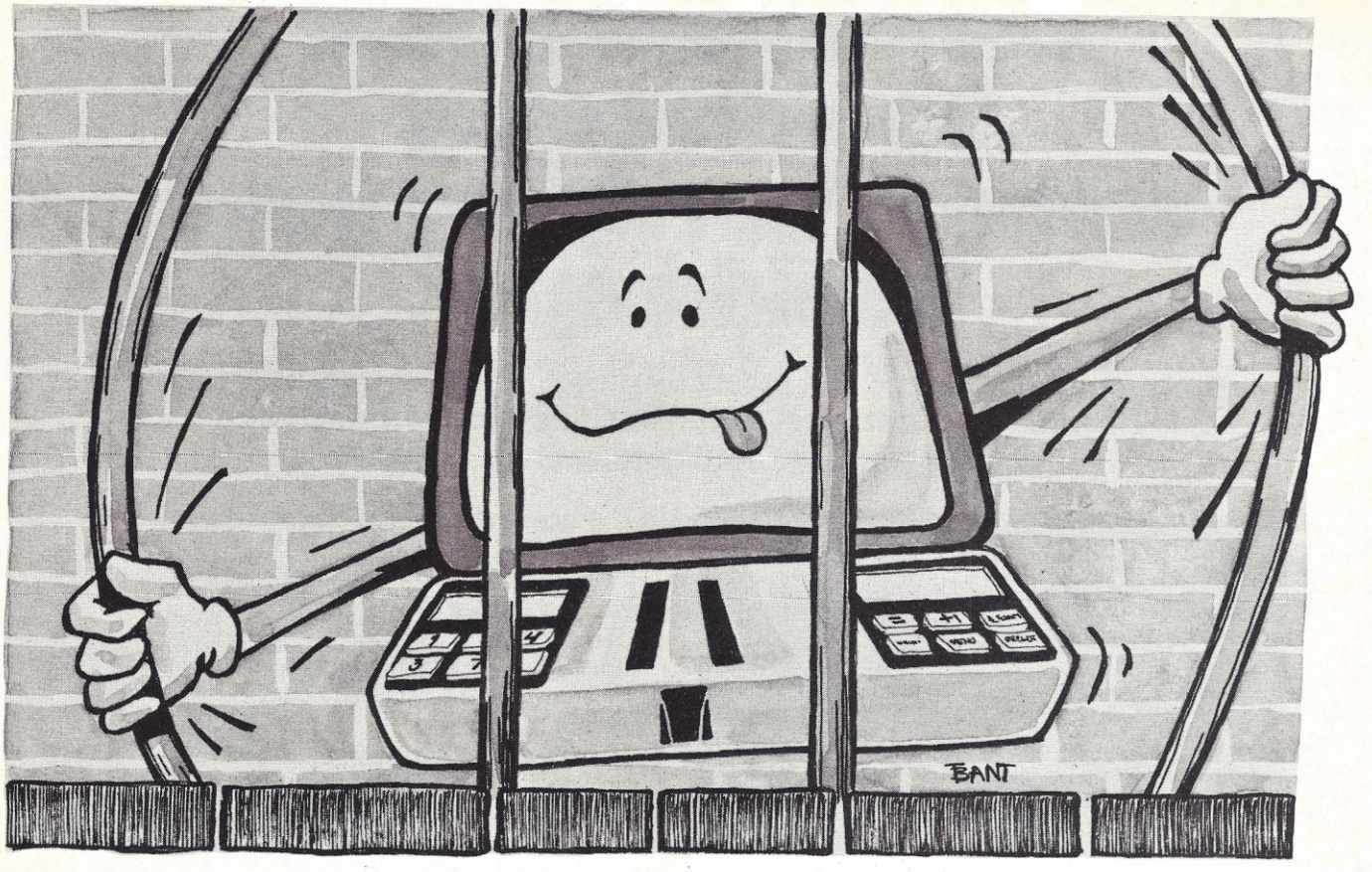

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CIRCLE 28

Local networks

continued from page 29

That information includes the family's name and address, the ages of each family member, which church the family attends, which schools the children attend and any special needs the family has or foresees having.

"The census we conducted prior to this one was done with the help of a large time-shared computer system," Donahue says. "This time around, though, we realized that the task was just too big to be handled efficiently through time-sharing."

Through McRam Computers in Framingham, Mass., the diocese was introduced to the M/NET system. Donahue liked what he saw.

Falling by the wayside

"We looked at a lot of systems, but they all fell by the wayside during the selection process," he says. "What we needed was a system that would support several users, provide us with a lot of memory storage and allow us to quickly get the information we needed. M/NET met all those requirements and was very reasonably priced."

Donahue says that the 1981 census has proved to be much more effective than previous diocese studies. Once all the pertinent information was collected and stored on hard disk, individual parish reports were printed and distributed to the various parish priests. These reports were then used in economic and social decision making. In the past, all the collected data was stored away in file cabinets and was rarely referenced.

"Now that the census has been completed, we're not just going to let the M/NET system sit around for the next 15 years," Donahue says. "We're now in the process of working it into our accounting department. With all the financial-modeling, data-base management, accounting and word-processing software available on this system, we're going to find endless uses for the network."

As more and more people become aware of the benefits inherent in systems like these, users of Nestar, Corvus and Micromation network systems are bound to increase substantially over the next few years.

It is just as likely that more networks will be developed. Tandy Corporation recently announced a new local network designed for users of its TRS-80 computers, and it appears that other potential networking giants are waiting in the wings.

CIRCLE 29

Baked Apple.

Last Thanksgiving, a designer from Lynn/Ohio Corporation took one of the company's Apple Personal Computers home for the holidays.

While he was out eating turkey, it got baked.

His cat, perhaps miffed at being left alone, knocked over a lamp which started

a fire which, among other unpleasantries, melted his TV set all over his computer. He thought his goose was cooked.

But when he took the Apple to Cincinnati Computer Store, *mirabile dictu*, it still worked.

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CIRCLE 30

Tax preparation

continued from page 53

beginning any others.

Another unique function is itemizing. You can use this with full-editing commands to list any names or sums required on any of the forms, dollar amounts first. You can add, delete, modify or insert items in the middle of a list. This list can be 1000 items long, although that is highly unlikely. (It is a function of the programming, not a real need.) Special itemization is available for reporting depreciation, return and royalites, gains and losses and special income on the Form 1040 or any of the required forms and schedules, such as C, D, E, F and 4797 or 4562.

All in all, this is a remarkably powerful program containing numerous forms and schedules for a remarkably low price. This should be the best choice for small tax-preparation offices or individual tax preparers.

E-Z Tax Computer Systems' **State Income Tax Program** is one of more than a dozen state and local tax-return programs that integrate with the CPAids Master Tax package. (CPAids does not manufacutre state and local tax software, but others like E-Z have software for California, Kansas, Maryland, New Jersey, New York, Ohio and Pennsylvania.)

If you use CPAids' Master Tax, using the E-Z program for all of the state and local forms for New York State, New York City and New Jersey is very easy because most of the numbers are automatically read from the appropriate Master Tax Form 1040. E-Z has prepared a very straight-forward, simple manual that is as good as the parent manual. It identifies all of the information that must be input by hand and all that can be done by computer. If you do not use Master Tax, you will have to input all of the raw figures by hand. Then, the only advantage to this program is automatic calculation.

This program also calls up state and local forms either automatically or by single keystroke at the proper place in form processing. Although it is short, the package is well prepared and easy to use.

Micromatic Programming's **Tax-Saver** has been revised for 1982 to be used with TRS-80 Model I computers. It is directed towards professionals instead of individuals. While the 1981 version presented all of the instructions practically line by line with each form and schedule, the new version allows a professional to avoid the instructions on the screen.

"We used to have a real problem with other corporations raiding our software people."

Long & short

Micromatic is now debating between two types of printouts. You may be able to use friction-feed IRS forms with pin-fed blank paper with overlays, or you might be forced to simply print out the information and copy it onto the forms. Exactly which printout Micromatic was going to use had not been decided in mid-October.

The new version will also be sold

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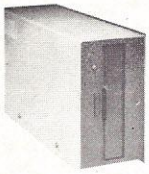

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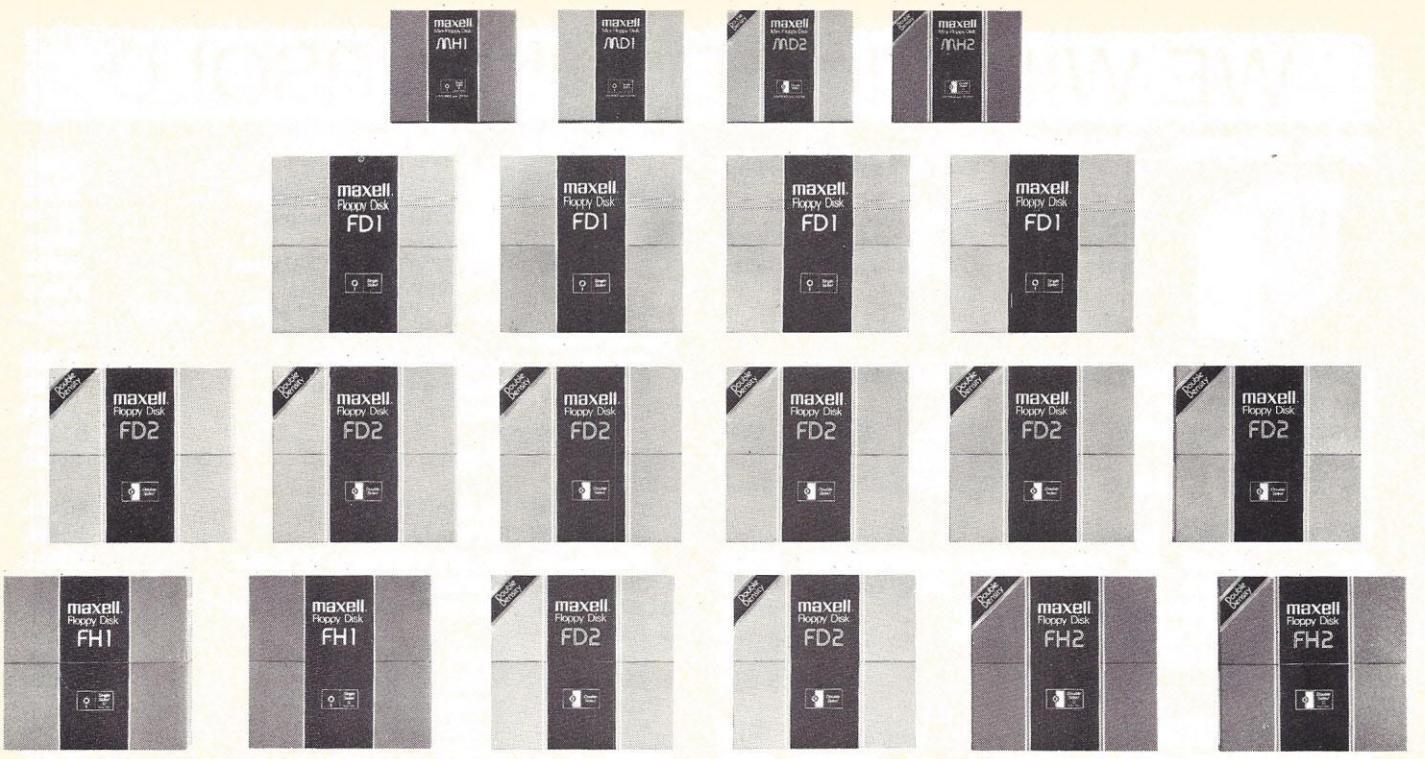
CIRCLE 31



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CIRCLE 32

in a short or long form. This does not correspond to the short or long form 1040, but to the types and numbers of schedules and forms each package includes. The short package includes the long-form 1040, Schedules A, B and TC and the forms for income averaging and maximum tax. The long package adds Schedule C and D for capital gains or losses. All of the figures integrate with a tax-planning package called the Tax Forecaster which is an inexpensive $30.

The 1981 version of this package was based on five separate disks, each of which was used for various forms and schedules. Designed for individuals, its manual and instruction screens give very detailed and precise discussions of each line and form. The manual is clear and professionally prepared, and explains how to take advantage of the minutiae of important subjects such as community property, alimony, items counted or not counted as income, and relatives and dependents through the most common schedules, A through SE. It includes a very helpful, complete glossary and a questionnaire. This is a very valuable tool for individuals and could be an excellent training device for accountants in small offices.

Microtax also has three tax-preparation products called **Level 1, 2, and 3.** The systems run on any CP/M machine having 56k of memory.

Level 1, which can print 23 schedules and forms and handle multiple clients, sells for $250. It also prints IRS-approved forms. Level 2 goes beyond the capabilities of Level 1 in that it does 30 schedules and forms, handles multiple clients and prints on either IRS-approved forms or overlays. In addition, it has a depreciation system and can handle and interface to several state-tax systems, also available from Microtax. It has an integrated data base, and can operate in batch computer and print mode.

Level 3 comes in two versions. It can either have the features of Level 2 plus partnership forms and schedules, in which case it sells for $1500. It can also be purchased with only the partnership forms, selling for $750.

All of the packages are in a compiled BASIC, which makes them very fast compared to packages that are written in interpreted BASIC.

Marilyn Smith, Microtax president, says that the company also has a demonstration package available

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CIRCLE 93

for $50. Update packages are also available which account for yearly variations in the tax laws. These cost $250.

A final feature of Microtax's system is a pro forma system. This allows tax practitioners to print out what clients did on last year's return, and compare that with their efforts in the current year.

Although these seven income-tax programs are useful, remember that a computerized tax package is no substitute for in-depth and accurate knowledge of the tax law. If you put tax garbage in, you get tax garbage out, along with a load of rapidly calculated trouble.

These programs are basially computational and sorting tools, not automated CPA robots. So don't buy one of these packages if you think it will do your accountant's job for you. It can only help him do his job faster.

INCOME TAX BUYERS' GUIDE

Company	Name/Cost	Configuration
Aardvark Software 783 North Water St. Milwaukee, WI 53202 (414) 289-9988	Individual Tax Plan $250; revisions $50 and annual updates 45% of original cost	48k Apple II Plus, DOS 3.3 or Pascal Lang. System, 1 or 2 drives; 80-col. printer; or Western Digital Microengine. **CIRCLE 200**
Contract Service Assoc. 706 South Euclid Anaheim, CA 92802 (214) 635-4055	Professional Tax System Model II–$1320 Models I & II–$940 (Can buy in modules) Updates: Module A–$225; New I & III Schedules–$37.95; New II Schedule–$47.95	TRS-80 48k Model I with 1-4 drives; 64k Model II with 2 drives; or 48k Model III with 2 built-in drives **CIRCLE 201**
CPAids 1640 Franklin Ave. Kent, OH 44240 (216) 678-9015	Master Tax Program $1500 Updates–$350 Corporate 1120–$500	Any 48k 8080/Z80 system with 2 disk drives of 320k capacity; CP/M operating system; friction or tractor feed printers **CIRCLE 202**
E-Z Tax Computer Systems 5 Eagle View Court Monsey, NY 10952	NY-NJ State Income Tax packages; NY State Resident $750 NJ State Non-Resident $250 NY City Non-Resident $150 New Jersey State $450 Emergency Transportation Tax $350	Any 56k 8080/Z80 system with 2 disk drives, printer **CIRCLE 203**
Howard Software Services 6713 Vista Del Mar La Jolla, CA 92037 &714) 454-5079	HowardSoft Tax Preparer 1981 Edition–$99 1982 Updates–$35 1982 Edition–$150 State Editions–$75	48k Apple II Plus, II Plus with Applesoft ROM, or III with II Emulator; two disk drives and 80- or 132-col. printer. **CIRCLE 204**
Micromatic Programming Co. P.O. Box 158 Georgetown, CT 06829 (203) 324-3009	Tax-Saver Short version–$80 Long version–$120 Tax-Forecaster–$30	TRS-80 Models I or III, 48k RAM, two drives, line printer. **CIRCLE 205**
Microtax 22713 Ventura Blvd., Suite F Woodland Hills, CA 91364 (213) 704-7800	Level 1–$250 Level 2–$1000 Level 3– With Level 2–$1500 W/O Level 2–$750	Any CP/M system with 56k of memory and a disk drive and line printer **CIRCLE 206**

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DEATH SHIP (by Rodger Olsen)
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VAMPIRE CASTLE (by Mike Bassman)
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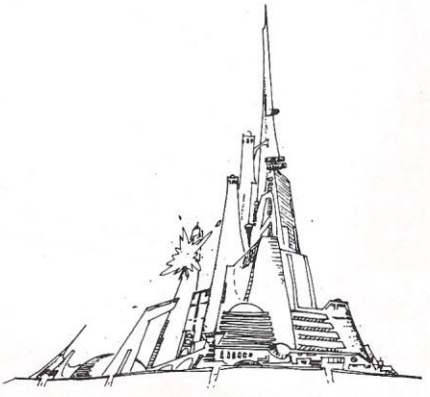

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CIRCLE 6

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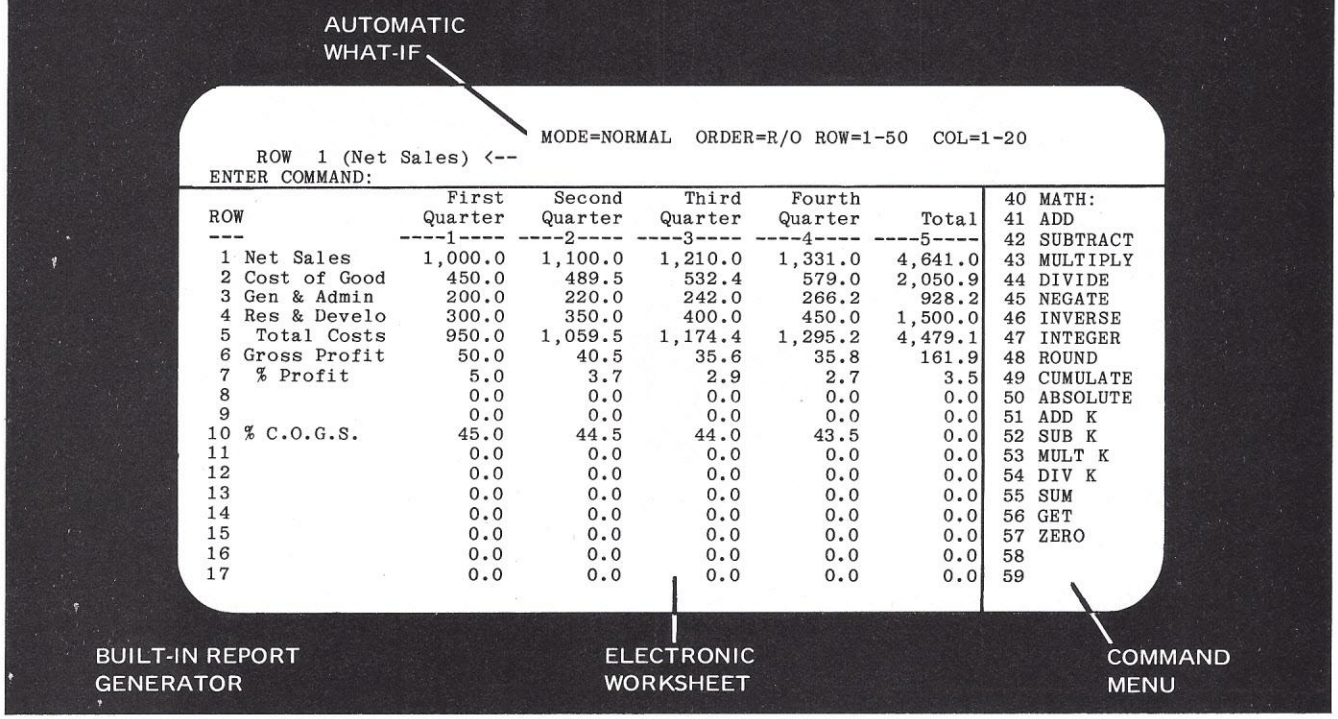

ROW	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Total
	----1----	----2----	----3----	----4----	----5----
1 Net Sales	1,000.0	1,100.0	1,210.0	1,331.0	4,641.0
2 Cost of Good	450.0	489.5	532.4	579.0	2,050.9
3 Gen & Admin	200.0	220.0	242.0	266.2	928.2
4 Res & Develo	300.0	350.0	400.0	450.0	1,500.0
5 Total Costs	950.0	1,059.5	1,174.4	1,295.2	4,479.1
6 Gross Profit	50.0	40.5	35.6	35.8	161.9
7 % Profit	5.0	3.7	2.9	2.7	3.5
8	0.0	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	0.0
10 % C.O.G.S.	45.0	44.5	44.0	43.5	0.0
11	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	0.0
17	0.0	0.0	0.0	0.0	0.0

40 MATH:
41 ADD
42 SUBTRACT
43 MULTIPLY
44 DIVIDE
45 NEGATE
46 INVERSE
47 INTEGER
48 ROUND
49 CUMULATE
50 ABSOLUTE
51 ADD K
52 SUB K
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55 SUM
56 GET
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59

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CIRCLE 88

In the future

continued from page 23

corp plans to set up 100 bank-from-home test sites using customers in New York to help evaluate its electronic-banking system. If successful, Citicorp may expand to include a variety of other videotex services, and perhaps go nationwide.

Going into orbit

With banking from the home as a starting point, we may soon find ourselves in the midst of a gargantuan home-information industry, called "electronic cottage" technology by Alvin Toffler in his latest book, *The Third Wave*. Instead of travelling to shop, work or seek entertainment, these things will be brought directly into our homes using personal-computer systems.

Home satellite "earth stations" promise to revolutionize our family life, linking earth-orbiting satellites, cables and computers to bring a wealth of information and services into our homes.

In 1975, RCA launched the Satcom I satellite for the purpose of broadcasting television programming directly to satellite-receiving ground stations in the U.S. The expense of satellite-receiving equipment initially restricted these signals to the cable companies, who in turn sold access to this programming to its subscribers. The subscribers then paid for cable hook-up plus a monthly subscription fee. Even with this hook-up, subscribers could only receive a small portion of available programming—that which the cable companies chose to send through their cables.

In 1979, the FCC ruled that anyone was free to own and operate a satellite-receiving station without licensing. The following year, companies began designing new equipment that drastically reduced the cost of satellite-receiving systems. Satellites such as Satcom, Westar and Comsat travel in a geosynchronous orbit, remaining in a constant position some 22,300 miles above the earth. To catch the signal transmitted via these satellites, home receivers require a dish-shaped antenna about 10 feet across. The price range for these antenna is from about $3000 to $6000, or they can be obtained in kit form for about $2000. Within five years

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CIRCLE 37

that cost will drop to about $400, and the size of the antenna will be reduced to a compact three feet in diameter. Satellite-signal reception will then become a reality for most American households.

Satellite communication also promises to replace the broadcast media as we know it today. But how will this degree of technology affect our home and family life?

One obvious result will be a significant increase in the amount of time spent at home, due to the redefining of our work life over the next two decades. Our families will evolve to a situation similar to home life in the agrarian age, where the family worked together from the home. The difference will be that whereas agrarian families worked their land in relative isolation, the electronic families of the future will work their "cottage enterprises" through networks that link them with the world. Work will become independent of the office environment, creating a work force that is contract-oriented rather than employment-oriented, similar to today's freelance author who works at home.

This brings about some very important social implications. The initial problem people will face will be dealing effectively with the tension in the family that will naturally arise from spending so much time together. With the family working together as a unit, children may once again become a producing part of the family's income, and as a result, our post-industrial society may see an increased birth rate. The very design of homes will change to accommodate these shifting family/home/work relationships.

Perhaps the most intriguing aspect of the new realm of computer-augmented telecommunications is that it is no longer science fiction. It is a very real phenomenon, evidenced by this year's electronic shows and conferences. The process of creating legislation to regulate these technologies has already begun. New copyright provisions for electronic media, a redefinition of the right to privacy and the deregulation of telecommunication industries all pose critical questions as to the quality of our future lifestyle.

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CIRCLE 38

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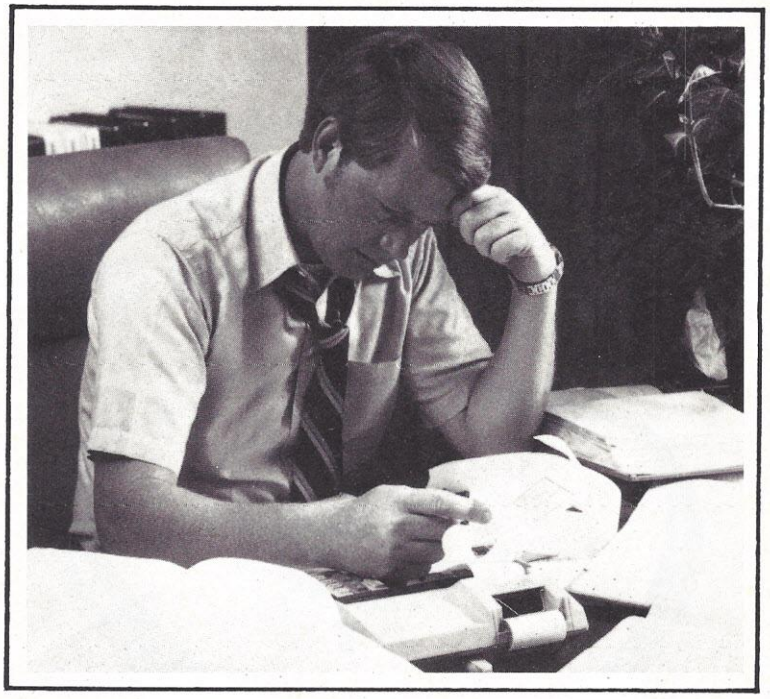
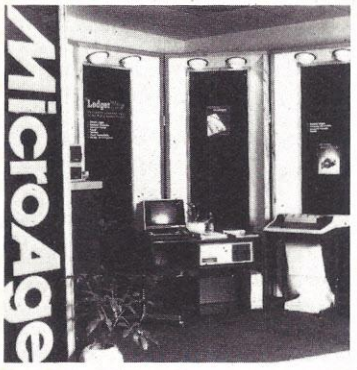
CIRCLE 39

CASH FLOW PROBLEMS?



IT'S NICE TO KNOW SOMEONE WHO HAS THE SOLUTION.



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Mike Schmidt (EDITOR) 80-US Jan/Feb pg. 94

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PREVIEW

Education

continued from page 68

York City public schools via a program of the New York Academy of Science. Students ranging from nursery school through ninth grade have used the language and have responded enthusiastically.

At Lamplighter School, it is recognized that children learn in a variety of ways and at different rates of development. Instruction is thus molded to the child, rather than forcing all children into one mold. Teachers are teamed within a grade level, enabling children to work at the pace they find comfortable yet challenging.

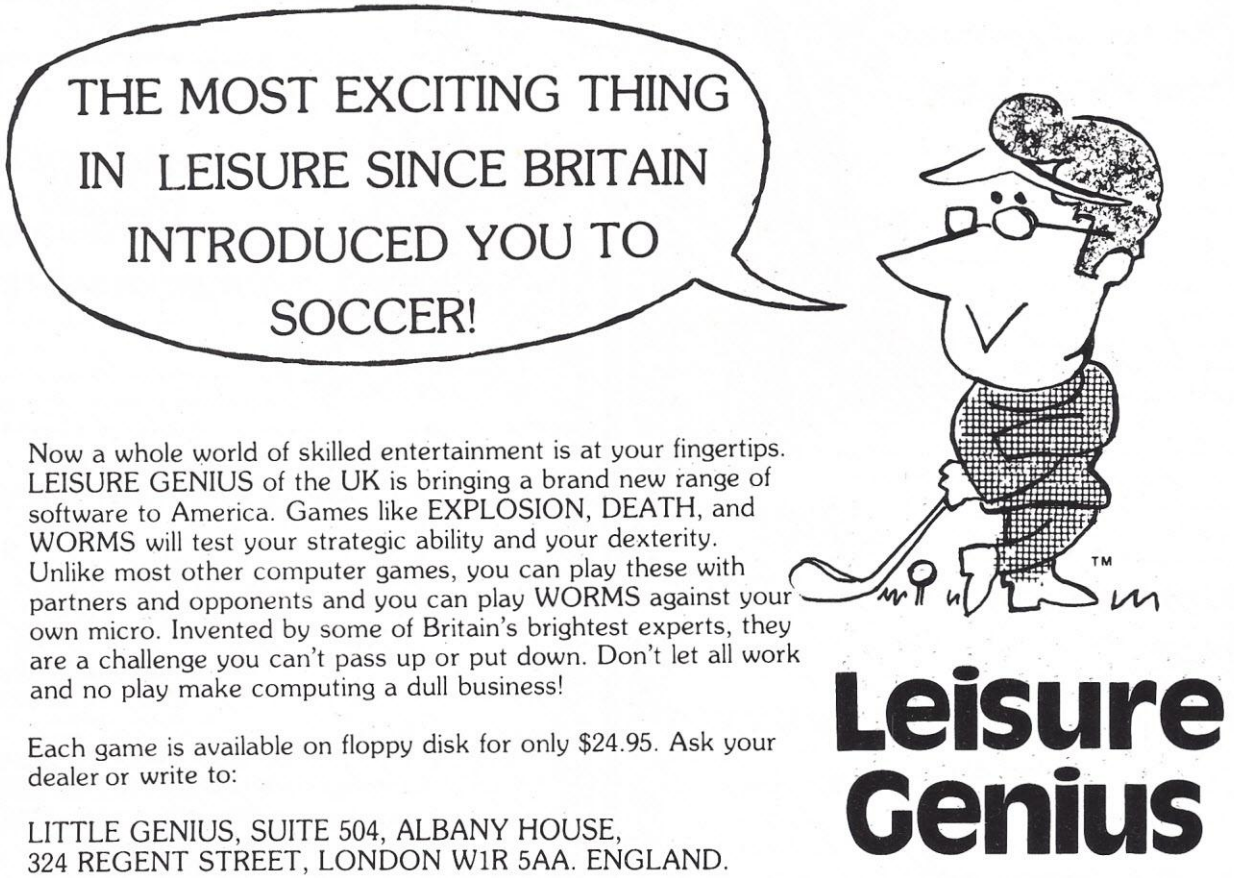
Because of this teaching philosophy, Lamplighter School was considered a good environment in which to study how children might relate to new concepts of learning with a computer. A collaboration was created involving the MIT Division of Study and Research in Education, Austin College in Sherman, Texas, and Lamplighter School. Fifty TI 99/4 personal computers were distributed among this group so that education students, who would eventually become teaching interns at Lamplighter, could be trained with the units.

Pat Mattingly, Director of Lamplighter School, says, "We began with the third and fourth graders, believing that was the most appropriate age, but we were surprised to discover than even three-year olds responded to the computer right away. One of our teachers who works with the youngest group is also involved in our computer training program, so it was easy for her to write the procedures for them to use.

"Three-year-old children are not the least bit intimidated by the computer," she says. "No one has told them that they have any reason to be afraid of it, so they just sit down and use it. They are totally in command, and the knowledge they pick up is remarkable. They know their directions. They are learning numbers and the alphabet. There is no telling what the computer will do to their reading skills, because they can already read the keyboard and type in instructions to make columns, shapes and sizes."

Taking charge

At Lamplighter, pre-school through first-grade students use LOGO as an instructional aid, rather than for developing their own



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Line up decimal points.
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Return carriage (at end of line).
Paper feed to pre-set starting point.
Indicate end of page.
Set tabs from one to many.
Clear tabs from one to all.
Set temporary margins (wherever you like) as often as needed.
Repeat all typing keys as needed.
Underline copy.
Print bold face and underline.
Do reverse print (white on black), sort of "reverse Video".
Allow alphabetic and decimal tabulation.
Indent paragraphs.
Store in non-volatile resident memory:
- Often used line formats (margins & tab stops).
- Often used phrases (up to 835 characters) in 10 "bins".
- Up to 10 complete forms (tax, medical, insurance, etc.).
- Up to 14,000 characters in an additional 26 "bins*".

Print perfectly spaced proportional letters.
Return to typing position after correction with relocation key.
Allow one character to overlap another (Ø).
Right margin justification.
Print two columns with both right and left margins justified and the center ragged.
Lift off errors (from single character to entire line).

*Optional at extra cost.

IT WILL EVEN:

Allow a carriage return without a linefeed or a linefeed without a carriage return.
Allow you to pre-set an impression control for high-quality carbon copies.
Allow both vertical and horizontal half-spacing.
Allow cancellation of copy before printing.
Allow express and normal backspacing.
Print in four different sizes: 10 pitch pica, 12 pitch elite, 15 pitch micron.
Allow insertion of a missing character in an already printed line.
Accept paper up to 17" wide.

Backspace 1/10, 1/12, 1/15 or even 1/60 of an inch.
Buffer and print out one word at a time, or one line or as many as 10 pages*.
Print up to 198 columns.
Do 1/2 line spacing for footnotes and scientific notation.
Accepts carbon film or reusable nylon ribbons.

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A lighted key to inform you that it's set to temporary margin.
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procedures. For this environment, the teachers have developed a series of procedures which offer color recognition, block building, shape comparisons and motion coordination. When a child tires of a particular program, he asks the teacher to set up a new exercise.

Most children then move on to take charge of the process themselves. They begin typing the control characters necessary to interrupt a program no longer wanted, and they then type the names of the programs they do want. The child begins to take charge of his own learning process which represents an example of learning-without-teaching in action.

Not just nine to five

By the second grade level, Lamplighter children feel quite comfortable with "programming" the computer, or, as they refer to it, "teaching the computer" a new procedure.

Children have virtually free access to the computers since they are located in the classrooms and in adjoining shared spaces. Children use any available time to interact with the computer, including coming to school early and staying late. Since TI LOGO requires little instruction, they can progress in many directions and explore the world of personal computing at their leisure.

Preschool children who have not yet learned to read or write are also exploring this "computer world" and are discovering they can make things happen by typing words on the keyboard. These words are written on cue-cards lying by the keyboard. Perhaps for the first time, they learn that alphabetic language serves a very real purpose. They can experience writing as a meaningful activity.

The influence that computers will ultimately have on the educational process is yet to be determined, but if current studies prove to be accurate, it is likely that the roles of students and teachers will undergo gradual but radical changes. Children will learn in new, self-determining ways, and teachers will act as guides rather than as oracles.

For students, their innate curiosity and sense of adventure will assume ever more important roles in accumulating knowledge. For teachers, the challenges are many. They must absorb the added dimension of the computer into traditional curricula and learn to adopt new techniques for stimulating a child's natural hunger for information which relates to the world as he knows it.

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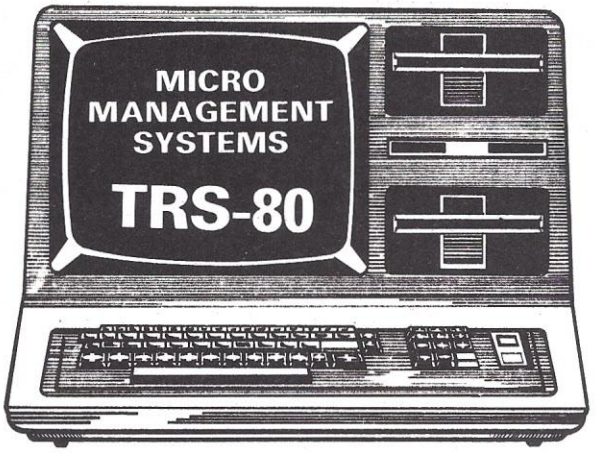

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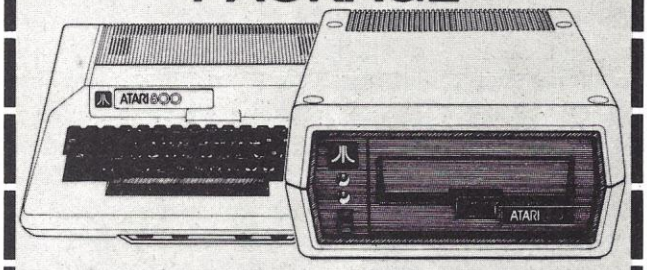

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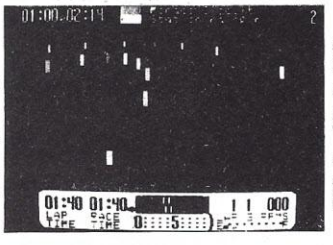

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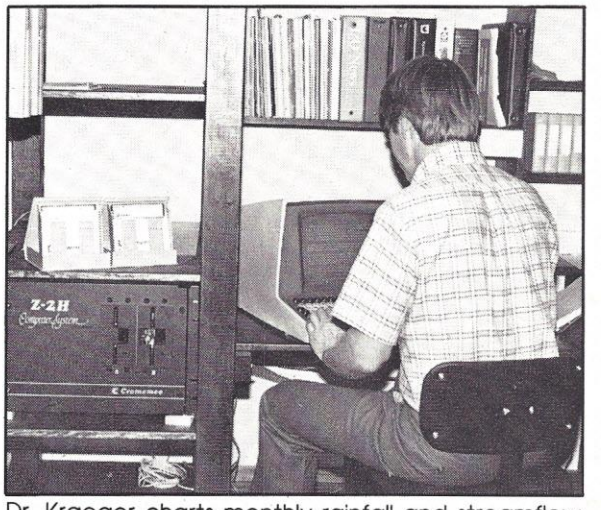
CIRCLE 47

OUTLOOK

continued from page 16

will be forthcoming from Cromemco, Dr. Kraeger feels there is almost no limitation to running a full scale, sophisticated simulation program on a Cromemco system.

Dr. Kraeger is extremely excited about the potential uses for personal computers in the field of hydrology. As he says, "Most hydrological-simulation programs are written in ANSI-standard FORTRAN. The Corps of Engineers, for example, has written all of their major simulation programs in that language. With the introduction of some of the new hardware Cromemco is developing, there is no reason these programs cannot be run on a personal-computer system instead of on a large mainframe."



Dr. Kraeger charts monthly rainfall and streamflow data for a period of 60 years.

Dr. Kraeger also says that, "In addition to the economies that can be gained, we will have a great deal more control over our computing requirements, enabling us to use our time more effectively."

The company also uses their Cromemco systems for word processing and accounting. All final reports and proposals are prepared using Cromemco's word-processing software. The reports can then be listed off on the Cromemco 3355a letter-quality printer.

Government forestalls electronic mail

The view that the U.S. Postal Service should stay out of electronic mail is the official line of the Reagan administration, the Department of Commerce

and the Department of Justice. The Postal Rate Commission (PRC) has been asked to take another look at the proposed Electronic Computer-Originated Mail service (ECOM) proposal. The rate commission will specifically examine the likelihood that the ECOM service, which the USPS hopes to have in operation in January, will be supported either by revenues from monopoly first-class mail service or from taxpayer-derived treasury subsidies.

This interpretation by the *Electronic Mail & Message Systems* newsletter points out that the jointly filed comments include the accusation that the USPS-operated electronic-mail service would be "wasteful." The newsletter also states that a government-operated service would serve to reduce the incentive for private firms to offer electronic-mail services.

The commerce department has spoken out several times in opposition to USPS electronic mail, states the newsletter, although never in the form of a presidential directive to the USPS to drop its electronic-mail plans. Now that the prospect of a postal strike is past, it seems that the Reagan administration may be gently stepping up the pressure on the USPS to drop ECOM.

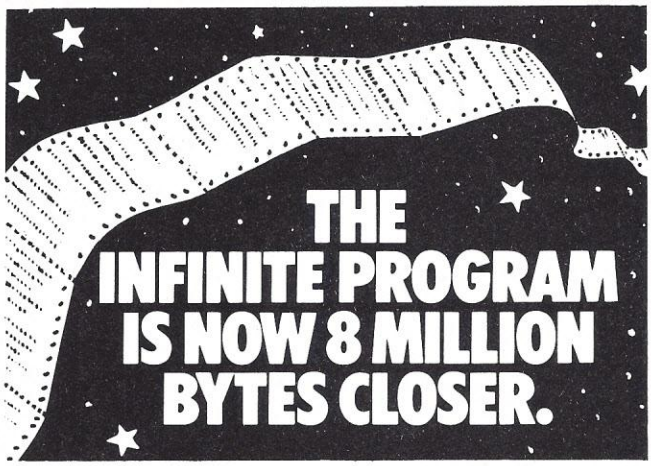
The new filings may be viewed both as a direct form of pressure on the rate commission and as an indirect indication to the USPS Board of Governors that the Reagan administration would like to see ECOM dropped. Perhaps most significant of all, according to the newsletter, is the wording of the filing. It is phrased as a general indictment of USPS electronic-mail activities.

On the assumption that the joint filing by the Commerce/Justice departments represents the position of the Reagan administration on USPS electronic mail, and that the filing concerns not only ECOM but future electronic-mail services, this could be the first step towards official administration support for policies that may lead to the repeal of some aspects of the Private Express Statutes.

A computerized card catalog

An elementary-school library in Broomfield, Colo., is the setting for a test project using a personal computer to end "catalog frustration" and promote resource use and computer literacy.

Staff frustrations at the Mountain View Elemen-



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CIRCLE 42

tary School included too many cards for each item, filing backlogs and the impossibility of keeping a current catalog. These frustrations stemmed from a lack of student skills such as alphabetizing, spelling and an inability to grasp the concept of "subject heading."

To curb these frustrations, large public libraries and a few school systems have computerized their catalogs using minicomputers or mainframe computers, which are financially beyond the reach of small libraries. The personal computers, while more reasonable in price, have lacked the storage and software capabilities to incorporate such a system. To alleviate these problems, a sealed hard-disk system must be used.

The system at Mountain View Elementary was developed using an Apple II and a Corvus 10-megabyte hard-disk system. The software was written according to specifications developed by Betty Costa, a library media specialist and consultant.

The custom software that Costa developed has three main phases. The first phase allows student access to the catalog items by subject, author or title. The second phase, a data-entry program, provides a fill-in screen which allows a one-time entry to be retrieved through information fields. The third phase involves information retrieval which may be achieved from a variety of angles. This phase can also produce a printed list for inventory, ordering and class projects.

The system has been well accepted by students and seems to be achieving its purpose of increasing interest and enthusiasm as well as increasing card-catalog and library-resource skills.

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CIRCLE 49

whelms and frustrates office employees, negatively affecting their productivity.

A recent report from A.B. Dick Company states that "Humanizing the workplace and concentrating on the human factor when adopting new systems and ordering new equipment is a key way to reduce the amount of frustration found in the office."

The report, *Frustration In The Workplace: Its Effect on Productivity,* says the reduction of this frustration is crucial to enhancing productivity. "Frustration lowers morale, causes absenteeism and turnover, and can result in work stoppages." The report also suggests that one way to reduce this frustration is for the manufacturers of copiers and word-processing machines to "address the frustration issue at the design, engineering, manufacturing, sales and service steps of business."

The study concludes that both office-equipment suppliers and office managers must consider the frustration issue or run the risk of perpetuating conditions that may stand in the way of productivity improvement."

Reports detail consumer trends

Consumers of the 1980s will see a marked growth in the use of personal computers as individuals health monitors and as an alternative to reading the evening newspaper. This information is presented in two market-research reports recently published by International Resource Development Corporation.

"Consumer Medical Electronics" details the boom in home medical electronics and states that within four years more than one million U.S. consumers will be using personal-computer software packages for monitoring their health, exercise and diet.

Home medical-electronic devices now represent one of the "hottest" consumer markets. The current growth rate of this market is more than 40 percent per year, as evidenced by the consumer rush to pur-

continued on page 104

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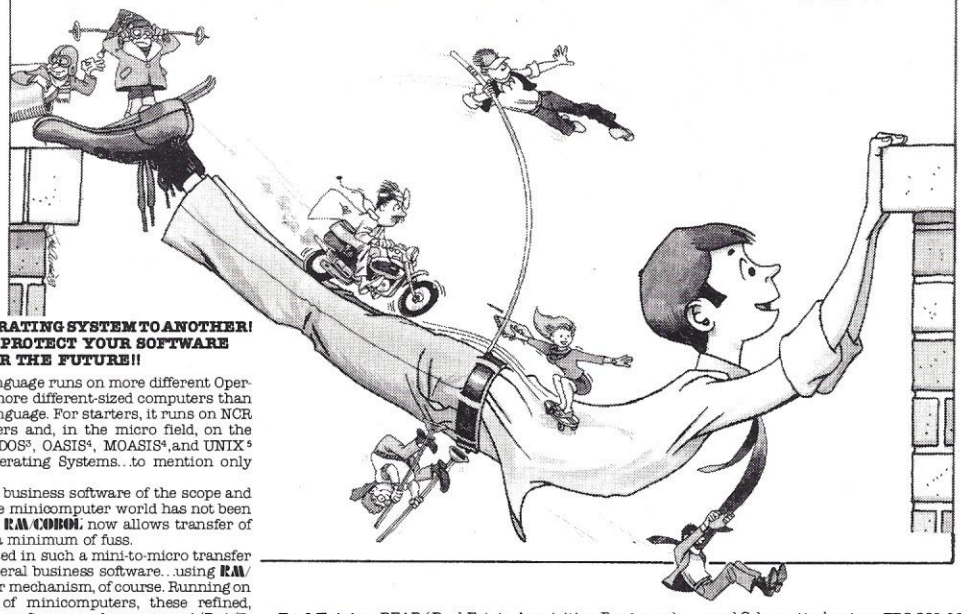

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CIRCLE 51

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CIRCLE 52

OUTLOOK

continued from page 101

chase blood-pressure monitoring devices, pulse-rate monitors, electronic thermometers and other such devices.

The report points to a major trend in the U.S. towards preventive medicine, in which consumers are seeking to avoid, rather than solve medical problems. The report states that "By the late 1980s consumers will be spending close to one-half billion dollars per year on electronic devices for health monitoring and disease prevention." Consumers are also expected to use videotex and home-information services, via cable TV or telephone, to access these services.

The emergence of medical-electronic devices for healthy people, the report states, marks a turnaround from the thrust of consumer medical electronics over the past 20 years. In the past consumers have been interested in restorative or prosthetic devices such as hearing aids and pacemakers. The new electronic-medical devices are a broader cultural trend away from complete reliance on physicians and established health-care methods. The emphasis is now on self-care and self-reliance.

The study also states that consumer medical-electronic devices are subject to strict regulation by the federal government. This regulation indicates that manufacturers or distributors must allow for a time-consuming and expensive approval process.

The strict regulation on these devices does not extend as far as software packages for personal computers. Therefore, the growth of health-tracking software is likely to be unimpeded by federal constraints.

The second IRD report, "The Outlook for Electronic Newspapers" states that during the 1980s the market for electronic-newspaper services will grow to more than $500 million, divided fairly evenly between consumer- and business-oriented services. News services will be used by only a small percentage of the population, generally those who have viewdata equipment or personal computers.

These electronic newspapers are expected to have very little impact on "paper versions" of newpapers. The study indicates that more than 90 percent of newspaper readers will continue to buy their news in the established form. The study also suggests that the real potential for the electronic-news products lies in providing information in greater depth than the "regular" newspaper provides.

Because electronic-news products are relatively easy to derive from "electronic newsrooms," the newspaper companies are expected to dominate the

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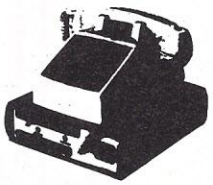

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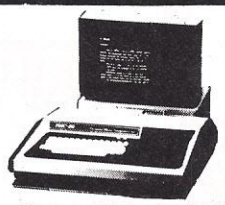

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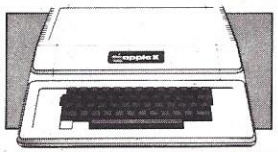

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3740/1 8" SOFT SECTOR	7.25	4.75	2.50
3740/1D 8" DBL. DEN.-SOFT SECTOR	10.75	6.90	3.85
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MD-1 5" SOFT SEC-TOR/DBL. DEN.	5.00	4.00	1.00
MD-2 = " SOFT SECTOR/DBL. SIDE/DBL. DEN.	7.00	4.90	2.10
FD-1 8" SOFT SEC./DBL. DEN.	6.50	4.50	2.00
FD-2 8" SOFT SEC./DBL SIDE/DBL. DEN.	8.50	5.95	2.55

TERMINALS
TELEVIDEO

	List	Our Price	SAVE
910	699.00	599.00	100.00
912C	950.00	699.00	251.00
920C	995.00	795.00	200.00
950C	1,195.00	949.00	246.00

DRIVES

CORVUS	List	Our Price	SAVE
5 MBYTES	3,750.00	3,050.00	700.00
10 MBYTES	5,350.00	4,449.00	901.00
20 MBYTES	6,450.00	5325.00	1,125.00

SOFTWARE
FOR APPLE II

	List	Our Price	SAVE
Apple Fortran	$ 200.00	$ 147.00	$ 53.00
DOS 3.3 (16 Sector)	60.00	45.00	15.00
Apple PILOT (16 Sector)	150.00	119.00	31.00
Apple FORTRAN (requires A2B0006) (16 Sector)	200.00	159.00	41.00
Language System with Apple Pascal	495.00	399.00	96.00
BPI General Ledger System	395.00	319.00	76.00
BPI Inventory Package	395.00	319.00	76.00
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Visicalc	200.00	159.00	41.00
Desktop Plan II	200.00	159.00	41.00
Microlab Database System	150.00	119.00	31.00
Stoneware DB Master	229.00	189.00	40.00
Muse Supertext II	150.00	119.00	31.00
Softape Magic Window	99.00	72.00	27.00

TEXAS INSTRUMENTS

	List	Our Pr	SAVE
TI 99/4A Console New Improved	950.00	385.95	564.05
10" Color Monitor High Resolution	374.95	317.95	57.00
32K Memory Module	399.95	312.95	87.00
Speech Synthesizer	149.95	127.95	22.00
Disk Memory Drive	499.95	390.95	109.00
RF Modulator	49.95	42.50	7.45
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	List	Our Price	SAVE
NOVATION CAT MODEM	189.95	140.00	49.95
NOVATION D-CAT	199.00	150.00	49.00
NOVATION APPLE-CAT	349.00	310.00	39.00
HAYES MICROMODEM	379.00	295.00	84.00
HAYES SMARTMODEM	279.00	239.00	40.00

CALCULATORS

CASIO	List	Our Price	SAVE
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FR-1210	129.95	99.00	30.95
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LC-785	12.95	10.00	2.95
LC-3165	12.95	10.00	2.95
FX-68 Scientific	29.95	23.00	6.95
FX-81 Scientific	19.95	17.00	2.95
FX-3600P Scientific	39.95	29.95	10.00
FX-602P "Computer Talk" 88 Memories Pro-gramming Upper & Lower Case Dot Matrix	129.95	99.00	30.95
FX-702P Solves Problems with Alpha-Numeric Clarity, uses Basic Language	199.95	159.00	40.95

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910	159.95	115.00	44.95
920	199.95	144.00	55.95
925 Remote	239.95	173.00	66.95
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960 Remote	399.95	288.00	111.95

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TOTAL ENCLOSED $ _____

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CIRCLE 54

future market for these products.

Strong growth is also predicted in the market for electronically delivered newletters for business subscribers and news-research data bases. The report points out that the business market for electronic-news products is in a more advanced stage of development than the consumer market. The business market already accounts for more than $40 million in annual revenues to suppliers, compared with less than $1 million for consumer products.

For more information on these reports, contact: International Resource Development, 30 High St., Norwalk, CT 06851; (800) 243-5008 or in CT; (203) 866-6914.

Atari opens software center

The first Atari Regional Software Acquisition Center has opened its doors for business in Sunnyvale, Calif.

"This center is probably the first of its kind," says Bruce W. Irvine, vice president of software for Atari's Computer Division. "It is designed to provide a place where qualified software developers can work with Atari equipment, have access to technical reference materials and be able to work with our staff who can answer their questions about our computers. It is an essential part of our thrust into the home market."

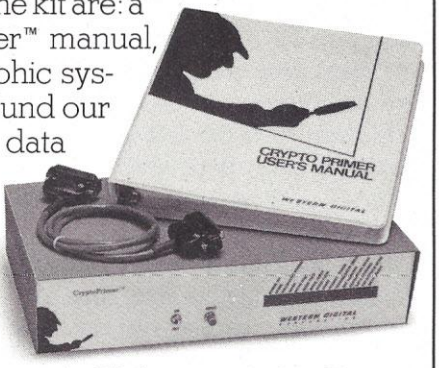
The 4000 square-foot center houses the administration and duplication facilities for the Atari Program Exchange (APX), which makes software written by users of Atari computers available through a quarterly catalog. More than 57 different programs are now offered through the catalog. In addition, the center houses a facility for the conversion of programs written for other computers to a format that will work on Atari computers.

"We are interested in acquiring software in the areas of entertainment, self-improvement, home management, education and system software," Irvine says. "We recognize that no one company can develop all of the software needed to service the consumer market, so we are working with third-party developers to fill out our line. We are also encouraging others to develop and market software products on their own or through our APX catalog.

"We are also planning other software acquisition centers in geographical areas where there are high concentrations of programmers and users, such as metropolitan areas with technical universities."

Unwrap the Crypto Mystery for $495.

Thanks to the Western Digital CryptoPrimer™ Development Kit, cryptography is no longer a deep, dark secret. In fact, the kit is specially designed for personal computer owners and is based on the National Bureau of Standards' data encryption algorithm. Included in the kit are: a CryptoPrimer™ manual, a cryptographic system built around our WD 2001/2 data encryption chip, a convenient RS 232 connector and a special hardware manual. All for just $495. Best of all, you'll end up with more than a clue on how to implement all the benefits of data encryption. So send your check or money order (including $9.00 for shipping and 6% sales tax if you're a California resident) to: Western Digital, 2445 McCabe Way, Irvine, CA 92714. Please also specify your computer's make and model number.



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CIRCLE 55

Monroe bows two computers

Touting the slogan, "The story's in our name," Monroe Systems for Business, which used to call itself "The Calculator Company," recently made its move into the personal-computer market. The two computers the company unveiled are not called personal computers. Rather, they are either the occupational computer or the educational computer.

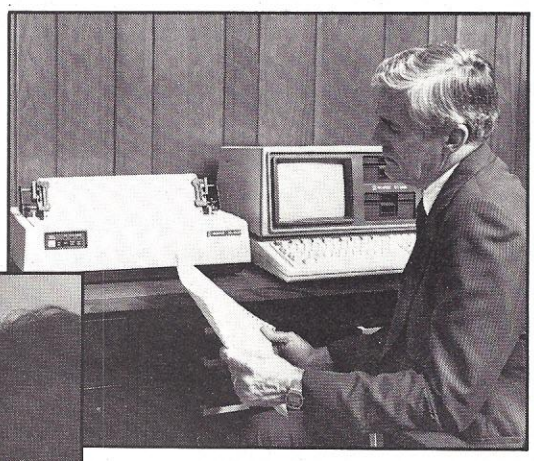
The occupational computers, so called because they are intended for use in business by managers who can thereby increase their personal productivity, come in two configurations, the OC 8810 and 8820. The 8810 sells for $3875 and comes with one disk drive, while the 8820 with two disk drives costs $4385.

In addition to the disk drives, both machines sport impressive standard features, as seems to be the rule with new computers.

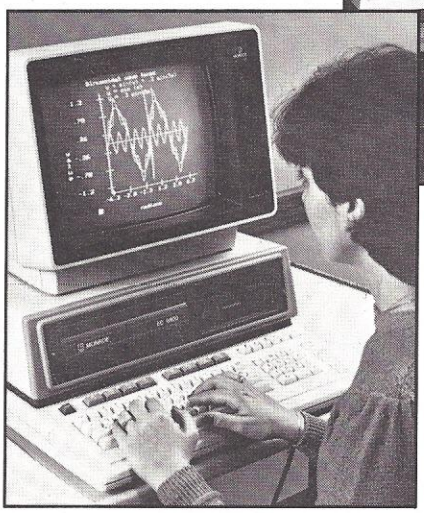
Both machines have an extended BASIC language, an operating system called, appropriately, the Monroe Operating System and an indexed sequential-access method system (commonly called ISAM), a file-access method. Both machines give the user 48k of RAM, which the company says is more than enough to hold the operating system, languages and one or more programs with associated data. Total file storage capacity is 650 kbytes with the two drives.

The keyboard is a standard typewriter model with the addition of a 15-key numeric pad, cursor-control keys, editing keys and user-definable function keys giving a grand total of 93 keys. (IBM'S personal computer has only an 83-key keyboard, so presumably this keyboard will provide greater functional ease to users.)

The Z-80A microprocessor that controls the computer has access to a total of 128 kbytes of memory, including ROM, and the processor, memory and display screen are all housed in a single unit. The keyboard is detachable for easy operation.



Monroe's occupational computer and educational computer have an extended BASIC, 48k of RAM, total file-storage capacity of 650 kbytes with two drives.



In addition, the 8810/8820 offers three RS-232-C communications ports with programmable baud rates and protocols for communication with a number of mainframe machines. The company plans to offer various peripherals, like printers and modems, that will connect to the ports. There will also be a cluster controller available, the company says, that will enable the computers to interface host-to-host and host-to-mainframe, or share a common printer.

At the same time, the company debuted its educational computer, the EC 8800. This machine is similar to the occupational computer, but with graphic capability and enhanced I/O structure.

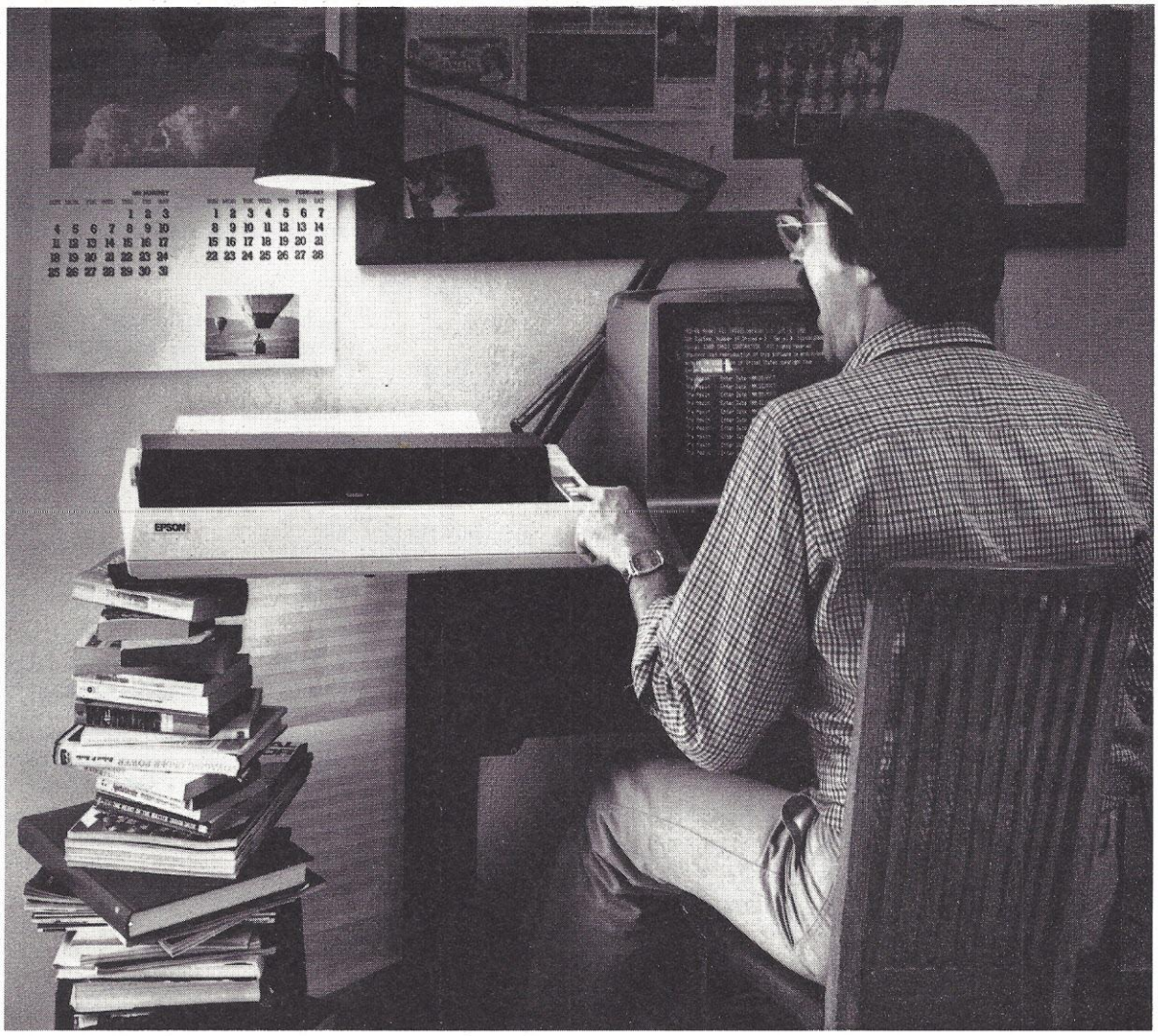
Standard configuration for the computer includes the same memory and microprocessor as the occupational computer, but only one disk drive. (A controller for the second drive is also standard.) Video outputs are standard on the machine—RGB color and monochrome composite video. The computer can simultaneously display color text in eight colors and high-resolution graphics in four of eight possible colors.

The back panel of the educational computer has the three RS-232-C ports that appear in the occupational computer. This one also has joystick sockets for use in moving the cursor around the screen. Also included are an AC outlet and an audio-output jack. Sound comes from the computer in four programmable channels with a frequency range of 92 Hz to 20,000 Hz.

The machine can also be used in TTY-emulation mode, so that schools using the unit can link up with state and district-wide computer networks, or commercial nets like The Source and Compuserve.

The educational computer sells for $3595.

For more information: Monroe, Morris Plains, NJ 07950; (201) 540-7300. **CIRCLE 150**



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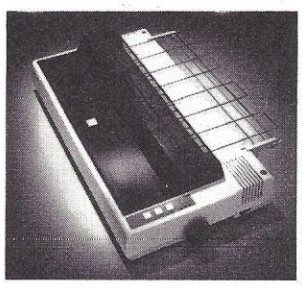
Needless to say, the specs on this machine — and especially at under $1000 — are practically unbelievable. But there's something about the MX-100 that goes far beyond just the specs; something about the way it all comes together, the attention to detail, the fit, the feel. Mere words fail us. But when you see an MX-100, you'll know what we mean.

All in all, the MX-100 is the most remarkable printer we've ever built. Which creates rather a large problem for those of us at Epson.

How are we going to top this?



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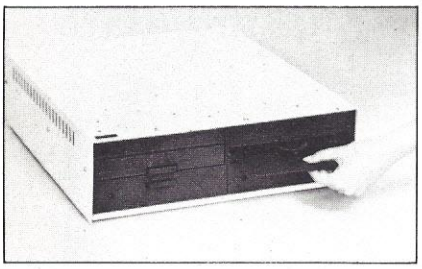
CIRCLE 56

HARDWARE UPDATE

PERIPHERALS

Disk Subsystem

The MS-800C is a disk subsystem compatible with Heath/Zenith 89, Apple II, TRS-80 Model II and S-100-based personal computers.

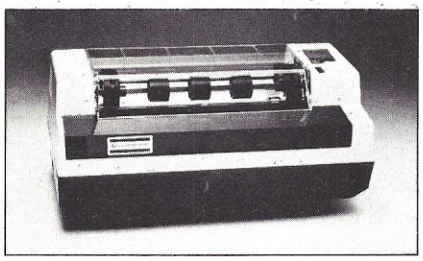


The subsystem includes case, power supply, fan, cables, and a choice of four different drive configurations including one single-sided drive, $1050; two single-sided drives, $1595; one double-sided drive, $1395; and two double-sided drives, $2095.

For more information: Matchless Systems, 18444 S. Broadway, Gardena, CA 90248; (213) 327-1010. **CIRCLE 151**

Dot-Matrix Printer

The VIC 1515 is a dot-matrix printer for the VIC 20 personal computer, capable of printing alphabetic, numeric and graphic symbols.



With a speed of 30 characters-per-second, the printer allows the user to create copy for forms, program listings, mailing labels, charts and graphs. Special enhancements also allow extra-wide and reversed (negative) character printing.

The price is $395.

For more information: Commodore Business Machines, Computer Systems Div., 681 Moore Rd., King of Prussia, PA 19406; (215) 337-7100. **CIRCLE 152**

Typewriter Adapter

The Tyrop converts IBM Selectrics and other comparable typewriters into computer-output printers.

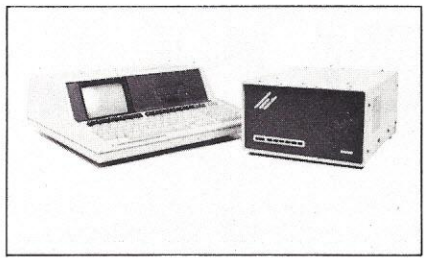
Features include a printing speed of 600 characters-per-minute; a variety of interfaces such as the RS-232-C, Centronics and IEEE-488 option; and a built-in self-diagnostic function to monitor printing.

The adaptor is distributed exclusively in the U.S., and costs under $1000.

For more information: Hollander Office Products, 41 Duesenberg Dr., Suite B, Thousand Oaks, CA 91362; (805) 496-2533. **CIRCLE 153**

Disk Storage

The 9800 Series 5-megabyte Winchester Disk-Storage Subsystems provide IEEE-488 bus-based systems with increased data-storage capacity.



The 9800 is a compact, stand-alone package consistng of a Seagate 5¼-inch Winchester disk drive, a single-board controller based on the 9000 Series micromodule, and a 115V/230V power supply.

Features include 22-bit error detection, 11-bit error correction, a 256-bit data buffer, single-command disk initialization, and switch-selectable bus address.

The price is less than $4000.

For more information: Microcomputer Systems, 432 Lakeside Dr.,

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CIRCLE 154

BOARDS

Memory Card

The AXP-32k Apple memory card provides the Apple II user with an additional 32k of RAM memory organized in two pages of 16k. This card increases the total RAM of the Apple II to 80k.

Included with the card is a disk containing the CTA Memory-Executive program which is an enhanced version of software employed by various 16k memory-expansion cards. The disk includes Applesoft and Integer BASIC, and operates by moving the second language to one page of the card and the DOS to the second page, giving the user 47k of free memory.

Software compatible with the AXP-32k include Integer BASIC, Applesoft, Pascal, Microsoft Z80 Softcard, VisiCalc, FORTRAN and LISA Version 2.0.

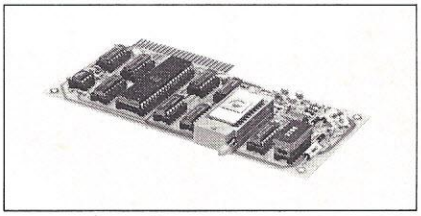
The price is $274.95.

For more information: Computer Technology Associates, 118 Castellano, El Paso, TX 79912; (915) 581-3500. **CIRCLE 155**

PROM Blaster

A PROM burner for the Apple II and TRS-80 Model I and III programs nine different EPROMs (24-pin variety) on the same board.

The system will program model 2704, 2708, 2716, 2732, 2508, 2516 and 2532 EPROMs. The package includes an interface card, a set of personality modules, software on disk and an instruction manual.



The price is $149.

For more information: Apparat, 4401 S. Tamarac Pkwy., Denver, CO 80237; (303) 741-1778. **CIRCLE 156**

Color Buffer

The Color Buffer, a peripheral for the TRS-80 Color Computer, gains access to the system bus through the game slot cartridge.

The buffer terminates in the standard 22/44 card-edge connector, providing the user with access to

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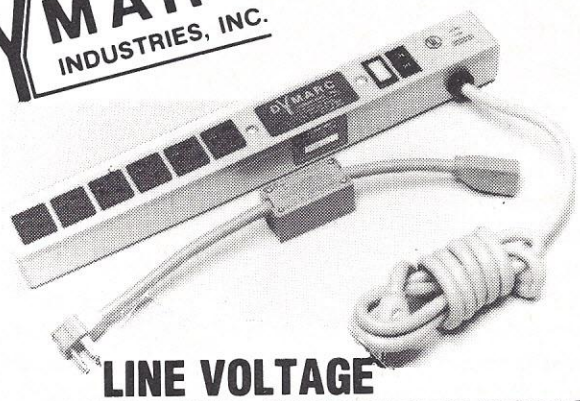

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Life expectancy	Printhead — 100 million char. Drive Mech. — 10 million char. Ribbon — 5 million char.	50 — 100 million char. 5 million char. 3 million char.
Dimensions	3.8″ × 15″ × 9″	5.2″ × 14.7″ × 12″
Character set	96 ASCII	96 ASCII
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Printhead replacement	$29.95	$30
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*Data source: Epson MX-80 Operation Manual

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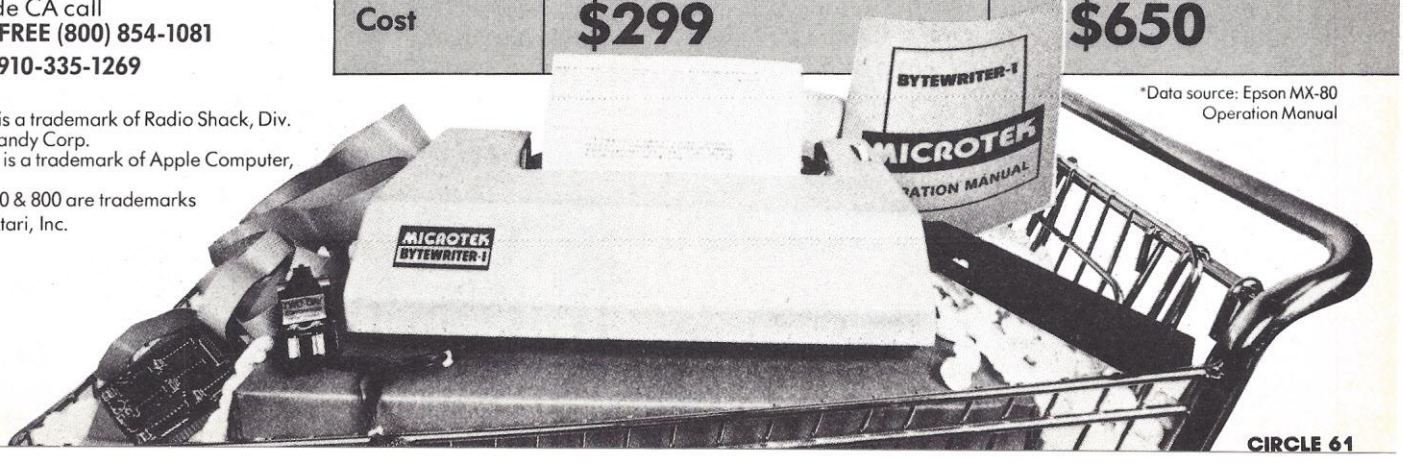

CIRCLE 61

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CIRCLE 62

fully buffered address, data and control lines. The buffer also serves as a building block, allowing the user to plug in other peripherals such as a RAM Cartridge, serial and parallel I/O boards and an EPROM programmer.

The price is $59.95 in the U.S. and $69.95 in Canada.

For more information: TBH Canada, 67-3691 Albion Rd., Ottawa, Ontario, Canada K1T 1P2. **CIRCLE 157**

Connector Kit

The GOLD PLUG 80 kit eliminates the sudden death or disk errors that occur due to oxidation of the tin/lead surface of the TRS-80 Model I expansion ports.

The kit is a 10 micron over nickel card-edge plug that is soldered to the existing tin/lead plated card-edge plug. It allows use of the existing female connectors on all cables, and existing expansion devices can be used without change.

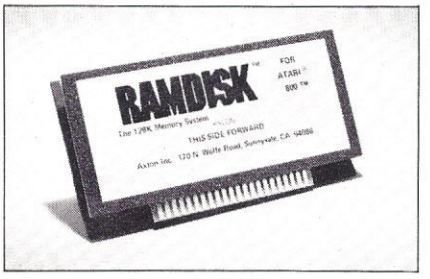
Kits are available for keyboard/CPU to expansion interface for $18.95 (both ends of the cable); and for expansion interface to disk, printer, screen printer or RS-232-C ports for $9.95 each. Texas residents add sales tax.

For more information: E.A.P., P.O. Box 14, Keller, TX 76248; (817) 498-4242. **CIRCLE 158**

Memory System

The RAMDISK Memory System for the Atari 800 has 128k and includes software allowing it to function like a disk device. The system can also be programmed as bank-selectable RAM memory.

The module is installed in the second RAM slot of the Atari 800, with 16k RAM modules in the first and third RAM slots providing 160k of RAM. The system is organized into eight 16k pages which can be selected under program control.

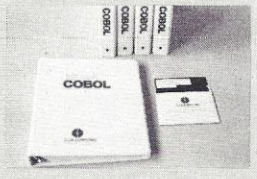


The system includes the 128k RAMDISK module, operating manual, DOS memory-management software and utility software.

The price is $699.

For more information: Axlon, 170 N. Wolfe Rd., Sunnyvale, CA 94086; (408) 730-0216. **CIRCLE 159**

NEVADA COBOL



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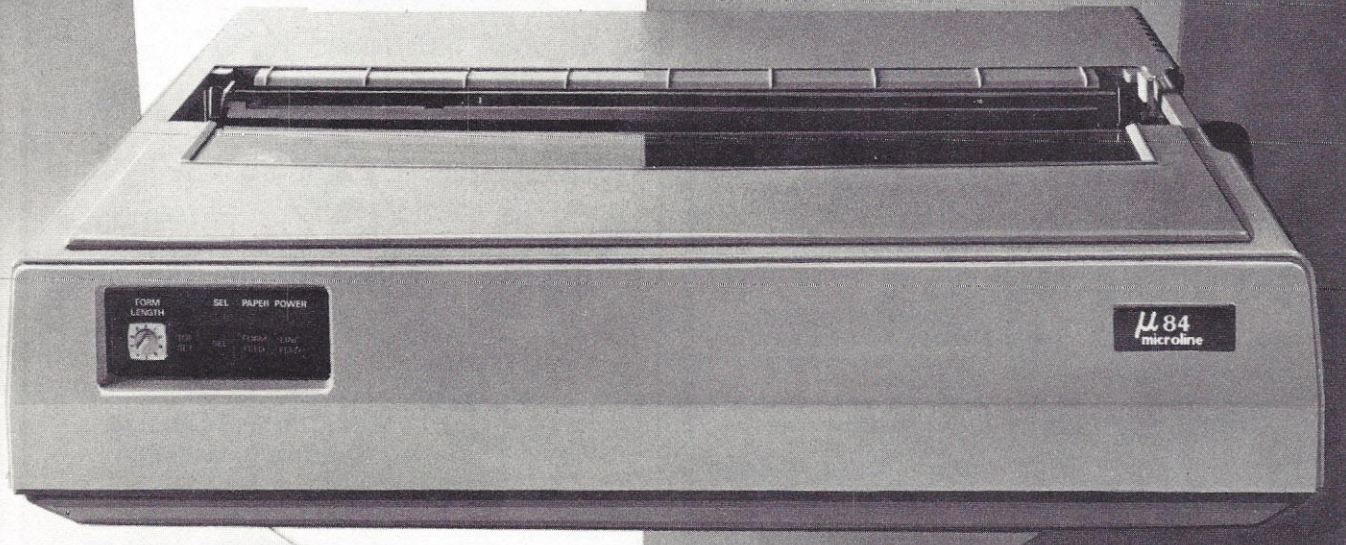

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Okidata is a subsidiary of Oki Electric Industry Company Ltd.

File it with VisiFile

VisiFile makes use of a personal computer as a file-management tool by handling record filing, searching, sorting, and printing reports and mailing labels. The program allows applications such as inventory; client lists and records; sales information; medical records and other word or numerical data to be stored, sorted and printed in a variety of formats.

The VisiFile FlexFormat feature lets the user change, rearrange and add unforeseen information to records, or combine business records into new files. This feature allows record keeping to adapt as quickly as information changes. For example, the change from a five-digit to a nine-digit zip code could be handled without rekeying all of the data. Users may also create a "partial file definition" for extremely fast data entry of specific portions of records.

VisiFile is controlled by a "moving cursor menu" with prompting. Information entry allows the user to custom design a "form-like" format on the screen for input, and machine-language sorting routines and multiple keyed-field indexes assure information retrieval within three seconds.

Mailing labels (up to five across) and reports may be printed with VisiFile. When the user is ready to print a report, he may use a simple "row-and-column" format, or develop a custom-format area six rows deep by the width of the paper. Elements of each record may be arranged in that area to suit the user. Records may be selected for printing in addition to being sorted or indexed.

All reports can be set up and saved with the program. Arithmetic calculations, including column totals, can also be handled in reports.

VisiFile records may also be transferred over phone lines by the VisiTerm program.

VisiFile runs on the Apple II with a language card or Applesoft-BASIC card, and on Apple II Plus personal computers with 48k minimum memory and one disk drive; however, two disk drives and a printer are recommended. The suggested retail price of the program is $250.

For more information: Personal Software, 1330 Bordeaux Dr., Sunnyvale, CA 94086. **CIRCLE 160**

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	LA120 DECwriter III RO	2,095	200	112	75
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	VT101 CRT DECscope	1,195	115	67	43
	VT125 CRT Graphics	3,295	315	185	119
	VT131 CRT DECscope	1,745	167	98	63
	VT132 CRT DECscope	1,995	190	106	72
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	TI765 Bubble Memory Terminal	2,595	249	138	93
	TI Insight 10 Terminal	695	67	37	25
	TI785 Portable KSR, 120 CPS	2,395	230	128	86
	TI787 Portable KSR, 120 CPS	2,845	273	152	102
	TI810 RO Printer	1,695	162	90	61
	TI820 KSR Printer	2,195	211	117	80
LEAR SIEGLER	ADM3A CRT Terminal	595	57	34	22
	ADM5 CRT Terminal	645	62	36	24
	ADM32 CRT Terminal	1,165	112	65	42
	ADM42 CRT Terminal	1,995	190	106	72
DATAMEDIA	DT80/1 CRT Terminal	1,695	162	90	61
	DT80/3 CRT Terminal	1,295	125	70	48
	DT80/5L APL 15" CRT	2,295	220	122	83
TELEVIDEO	920 CRT Terminal	895	86	48	32
	950 CRT Terminal	1,075	103	57	39
NEC SPINWRITER	Letter Quality, 7715 RO	2,895	278	154	104
	Letter Quality, 7725 KSR	3,295	316	175	119
GENERAL ELECTRIC	2030 KSR Printer 30 CPS	1,195	115	67	43
	2120 KSR Printer 120 CPS	2,195	211	117	80
HAZELTINE	Executive 80/20	1,345	127	75	49
	Executive 80/30	1,695	162	90	61
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CIRCLE 66

SOFTWARE UPDATE

BUSINESS

Word Processing

Wordstar, a word-processing system for business applications, is available for the Apple II.

WordStar features formatting on CRT screens, horizontal scrolling, column move, copy and delete, and an optional spelling checker called SpellStar.

Also available for the Apple are MailMerge, a data- and text-merging tool that enables WordStar to produce personalized form letters, and to merge and chain files; SuperSort I, which provides data-sorting, merging and selecting functions; and SpellStar, an automatic proofreader that exposes misspellings and typographical errors using a 20,000-word main dictionary that can be expanded and updated.

The prices for these programs are: Wordstar, $375; MailMerge, $124; SuperSort, $200; and SpellStar, $187.50.

For more information: MicroPro International, 1299 Fourth St., San Rafael, CA 94901; (415) 457-8990.
CIRCLE 161

Business Graphics

The Mannesmann TallyT-3000 matrix line printer with multi-font option offers increased character-generation flexibility such as business graphics, subscripts, superscripts, labels and forms. The multi-font option includes host-defined fonts, high-resolution characters and double-high characters.

In addition to the standard 96-resident characters, up to 288 user-defined characters can be stored without sacrificing the printer's speed of 300 lpm.

Prices start at $5495.

For more information: Mannesmann Tally, 8301 S. 180th, Kent, WA 98031; (206) 251-5524.
CIRCLE 162

Management System

The Condor Series 20/rDBMS relational data-base management system features business-English

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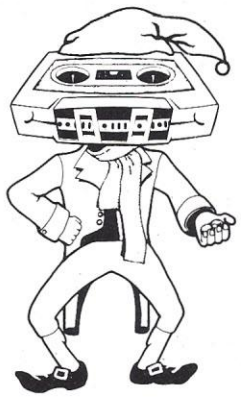

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The Fine Print:
Issues are sent First Class Mail.
All issues from Oct. 78 on available — ask for list (24 Level I issues also).
Programs are for 16K Level II, 16K Model III, and occasionally for disks.
Calif. residents add 6% to single copies and anthologies. Overseas — add $10 to subscriptions, $5 to anthologies, and $1 to single copies. Sent AO rate.
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For the COLOR COMPUTER:
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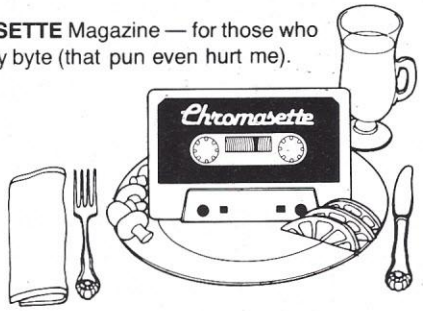
CHROMASETTE Magazine — for those who relish every byte (that pun even hurt me).



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CIRCLE 68

commands and relational data-base structuring.

The software can be used to create custom programs for accounting functions, inventory control, record keeping, time and personnel reporting, and mailing-list management.

The system is compatible with Z80 based personal computers, requires at least 48k of RAM, at least one floppy or hard disk drive, and runs on the CP/M operating system.

The price is $995.

For more information: Condor Computer, P.O. Box 8318, Ann Arbor, MI 48107; (313) 769-3988. **CIRCLE 163**

Finance Programs

Finance Programs #1 is a home/business software package for the TRS-80 Color Computer that is divided into two categories, loans and investments.

The loans program performs principal, regular payment, last payment, remaining balance, term, annual interest rate and declining interest on loans.

The investments program calculates future value of regular deposits, initial investment, minimum investment, earned interest tables, and regular withdrawals from an investment.

The price is $21.95

For more information: Computerware, Box 668, 1472 Encinitas Blvd., Encinitas, CA 92024; (714) 436-3512. **CIRCLE 164**

Data-Base System

Pegasus is a data-base management system written in Pascal for the Apple II.

With this software, the user can define a data base, insert from a text file or interactively, delete, modify records, print reports and select subsets from the data base to be printed or written to a text file for input to another program.

The system is menu driven and all sorts are done upon insertion after all data has been entered. Also, an update service is available with the system.

The price is $199.95 including reference and cookbook manuals and the update service.

For more information: Shakti Systems, P.O. Box 94543, Schaumburg, IL 60194; (312) 885-0831. **CIRCLE 165**

Formatting Aids

Visi-Caids is a companion package of programs for use with VisiCalc text files.

Features of the package include the label splitter, which creates a new text file to divide wide label entries in a selected column into two or more narrower columns; a print-file option and width adjuster to print or display VisiCalc models with variable-width columns; a program that reads VisiCalc print files; and a program that prints or displays formulas, labels, etc. and their coordinates arranged by column in ascending order.

The package is available in DOS 3.2 or 3.3 Applesoft and costs $34.95.

For more information: Data Security Concepts, P.O. Box 31044, DesPeres, MO 63103; (314) 965-5044. **CIRCLE 166**

EDUCATIONAL

Topic Tutorials

The first two releases in the Lesson-Tutorgraph series of single topic tutorials are Weather Fronts and Shore Features.

Weather Fronts provides an introduction to the concepts of weather fronts, such as their structure and nature. Concepts presented include front characteristics, frontal movement, and weather characteristics of different types of fronts. Six color cross-sectional diagrams illustrate

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cold, warm, and occluded frontal structures.

The purpose of Shore Features is to acquaint the student with the geographical features of the shore/beach area of the coast.

Each lesson comes with a teacher/student user manual and requires an Apple II Plus or Apple II with Applesoft in ROM or Language system, one disk drive, and DOS 3.3.

The price for each tutorial is $24.95.

For more information: TYC Software, 40 Stuyvesant Manor, Geneseo, NY 14454; (716) 243-3005. **CIRCLE 167**

Test Correction

The Educational Assessment Test-Correcting System enables school districts to grade their own school-wide and district-wide examinations. The system correlates student objectives with specific performance indicators, and produces reports for three levels within a school district.

The system is for personal computers using CP/M and Microsoft BASIC-80, including Apple and TRS-80 Models I, II and III. The price is $2000.

For more information: Applied Educational Systems, RFD #2, Box 213, Dunbarton, NH 03301; (603) 774-6151. **CIRCLE 168**

Attendance Tracking

The Attendance Tracking System (ATS) automates student attendance record keeping, accommodating continuous attendance records for one to eight periods-per-day for 180 days.

Available reports include: daily absence, cumulative absence, teacher discrepancy, individual history, parent notice, absence pattern, student list and faculty list.

The system is for the Apple II or Bell & Howell personal computer. The price is $995.

For more information: Edu-Comp, 14109 S.E. 168 St., Renton, WA 98055; (206) 255-7410.

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CIRCLE 73

The $149.95 personal computer.

Introducing the Sinclair ZX81

If you're ever going to buy a personal computer, now is the time to do it.

The new Sinclair ZX81 is the most powerful, yet easy-to-use computer ever offered for anywhere near the price: only $149.95* completely assembled.

Don't let the price fool you. The ZX81 has just about everything you could ask for in a personal computer.

A breakthrough in personal computers

The ZX81 is a major advance over the original Sinclair ZX80—the world's largest selling personal computer and the first for under $200.

In fact, the ZX81's new 8K Extended BASIC offers features found only on computers costing two or three times as much.

Just look at what you get:

- Continuous display, including moving graphics
- Multi-dimensional string and numerical arrays
- Mathematical and scientific functions accurate to 8 decimal places
- Unique one-touch entry of key words like PRINT, RUN and LIST
- Automatic syntax error detection and easy editing
- Randomize function useful for both games and serious applications
- Built-in interface for ZX Printer
- 1K of memory expandable to 16K

The ZX81 is also very convenient to use. It hooks up to any television set to produce a clear 32-column by 24-line display. And you can use a regular cassette recorder to store and recall programs by name.

*Plus shipping and handling. Price includes connectors for TV and cassette, AC adaptor, and FREE manual.

If you already own a ZX80

The 8K Extended BASIC chip used in the ZX81 is available as a plug-in replacement for your ZX80 for only $39.95, plus shipping and handling—complete with new keyboard overlay and the ZX81 manual.

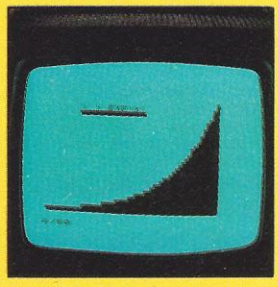
So in just a few minutes, with no special skills or tools required, you can upgrade your ZX80 to have all the powerful features of the ZX81. (You'll have everything except continuous display, but you can still use the PAUSE and SCROLL commands to get moving graphics.)

With the 8K BASIC chip, your ZX80 will also be equipped to use the ZX Printer and Sinclair software.

Warranty and Service Program**

The Sinclair ZX81 is covered by a 10-day money-back guarantee and a limited 90-day warranty that includes free parts and labor through our national service-by-mail facilities.

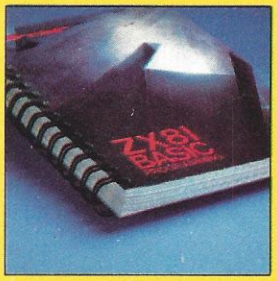
**Does not apply to ZX81 kits.



NEW SOFTWARE: Sinclair has published pre-recorded programs on cassettes for your ZX81, or ZX80 with 8K BASIC. We're constantly coming out with new programs, so we'll send you our latest software catalog with your computer.

ZX PRINTER: The Sinclair ZX Printer will work with your ZX81, or ZX80 with 8K BASIC. It will be available in the near future and will cost less than $100.

16K MEMORY MODULE: Like any powerful, full fledged computer, the ZX81 is expandable. Sinclair's 16K memory module plugs right onto the back of your ZX81 (or ZX80, with or without 8K BASIC). Cost is $99.95, plus shipping and handling.



ZX81 MANUAL: The ZX81 comes with a comprehensive 164-page programming guide and operating manual designed for both beginners and experienced computer users. A $10.95 value, it's yours free with the ZX81.

The $99.95 personal computer.

Introducing the ZX81 kit

If you really want to save money, and you enjoy building electronic kits, you can order the ZX81 in kit form for the incredible price of just $99.95* It's the same, full-featured computer, only you put it together yourself. We'll send complete, easy-to-follow instructions on how you can assemble your ZX81 in just a few hours. All you have to supply is the soldering iron.

How to order

Sinclair Research is the world's largest manufacturer of personal computers.

The ZX81 represents the latest technology in microelectronics, and it picks up right where the ZX80 left off. Thousands are selling every week.

We urge you to place your order for the new ZX81 today. The sooner you order, the sooner you can start enjoying your own computer.

To order, simply call our toll free number, and use your MasterCard or VISA.

To order by mail, please use the coupon. And send your check or money order. We regret that we cannot accept purchase orders or C.O.D.'s.

CALL 800-543-3000. Ask for operator #509. In Ohio call 800-582-1364. In Canada call 513-729-4300. Ask for operator #509. Phones open 24 hours a day, 7 days a week. Have your MasterCard or VISA ready.

These numbers are for orders only. For information, you must write to Sinclair Research Ltd., One Sinclair Plaza, Nashua, NH 03061.

sinclair

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	PRICE†	QTY.	AMOUNT
ZX81	$149.95		
ZX81 Kit	99.95		
8K BASIC chip (for ZX80)	39.95		
16K Memory Module (for ZX81 or ZX80)	99.95		
Shipping and Handling	4.95		$4.95
To ship outside USA add $10.00			
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MAIL TO: Sinclair Research Ltd., One Sinclair Plaza, Nashua, NH 03061.

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† U.S. Dollars

improvisation, articulation and spelling.

Accompanying the cassette is the "Game Power for Phonics" manual with 1280 language games.

For the Apple II and TRS-80 personal computers, the program costs $24.50.

For more information: Spin-a-test Co., 404 Old Orchard Ct., Danville, CA 94526; (415) 837-4532.

CIRCLE 170

UTILITY

Operating System

DBOS (Data Base Operating System) is a CP/M-compatible operating system designed for Micromation's M/NET multiprocessor personal computers. Features include an embedded data-base management system, passwords, file protection and data handling in a multi-user environment.

The software was created for hard-disk systems with multiple users and contains an integral data-base management system, allowing each user to work with the entire data bank. All information files can be indexed using up to 16 different ISAM keys for programming changes and rapid data retrieval. Search time is reduced by automatic file updating and sorting.

The DBOS operating system is included in all M/NET multi-user systems. The cost ranges from $5500 for a single-user system to $26,850 for an eight-user system with hard disk and tape back-up.

For more information: Micromation, 1620 Montgomery St., San Francisco, CA 94111; (415) 398-0189. **CIRCLE 171**

Data Organizer

The Color Data Organizer for the TRS-80 Color Computer stores, retrieves, sorts and prints information, and holds 125 records in 16k. The system can also collect, organize and print the user's information in his own data base.

The price is $24.95.

For more information: Computerware, Box 668, 1472 Encinitas Blvd., Encinitas, CA 92024: (714) 436-3512. **CIRCLE 172**

Utility Disk

XDIR, the feature program on the DMM-1 utility-software disk, displays the disk-directory file names in

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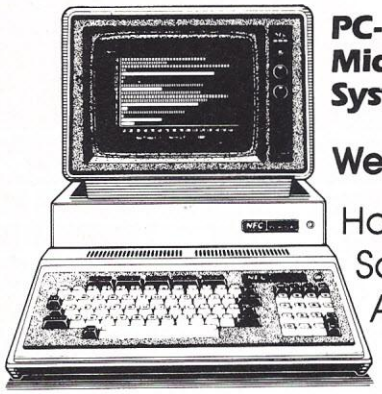

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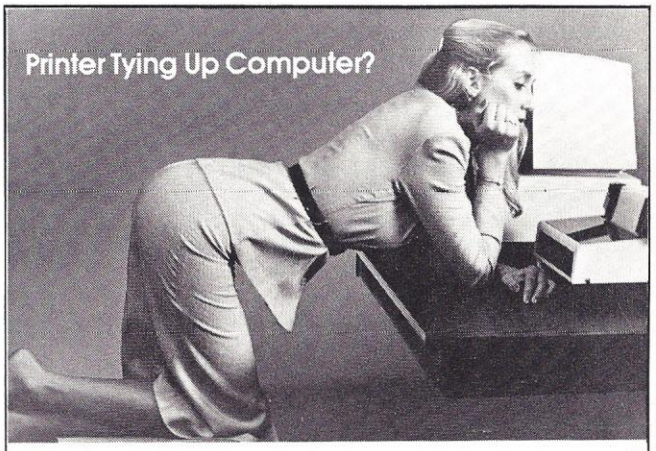

THEN PARALLEL PROCESS!

CUE is a programmable processor which rapidly accepts from your computer data to be printed and then goes off-line to drive the printer-independent of your computer, which is now free. CUE is better than software spooling since none of your computer's memory, processing power, or disk drives are tied up. CUE is available in parallel, serial, or with both in 2 and 4 port models (connect several printers or computers) with from 16K to 32K memory. Use as an interface.

Prices begin at $299.

MicroCompatible, Inc.
P.O. Box 7624, Atlanta, GA 30357 (404) 874-8366

CIRCLE 75

alphabetical order and shows the file size for each file name.

A disk-usage summary is provided, reporting the number of bytes on the disk, the number of file names in use and the space used. It also reports the number of available file names and space. XDIR works on single-density and double-density floppy disks as well as with hard disks.

The disk also contains an Extract program which lists a portion of a file between two label names. Strip removes the hex code from a PRM file and turns it back into the ASM file.

The Sort program creates a symbol table from an assembly done with ASM, and can be listed or used with SID, the Digital Research debugging program. Convert changes all uncommented lowercase characters to uppercase. Status provides information about the current operating system—memory available, TPA size, top of memory address and I/O assignments.

DMM-1 comes on an 8-inch single-density disk or on a 5¼-inch disk for North Star CP/M users. The price is $35 plus $1.50 for shipping and handling.

For more information: Elliam Associates, 24000 Bessemer St., Woodland Hills, CA 91367; (213) 348-4278. **CIRCLE 173**

COMMUNICATION

Electronic Mail

Two communications programs, Micro-Courier and Micro-Telegram, turn an Apple II into a communications tool. This allows the computer to send many forms of business information to another Apple and to access Western Union communications lines.

Micro-Courier is designed for professional use by businesses, managers and others who frequently require overnight or instant exchange of information. It allows an Apple II user to automatically transmit charts, graphs, correspondence, VisiCalc reports and programs over standard phone lines.

The user can transmit messages locally or nationwide to a time-sharing data base or to a minicomputer. The user can also check the status of outgoing mail, monitor incoming mail and send a message to 100 recipients. The program re-dials automatically if the line is busy.

Micro-Telegram enables users to access Western Union services; send mailgrams; and send and receive

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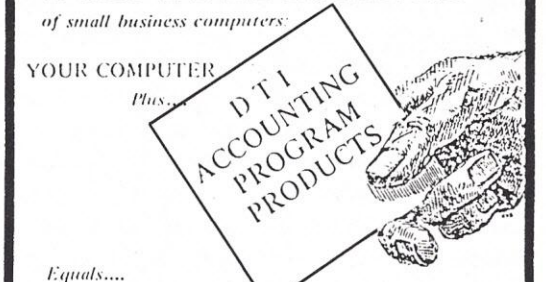

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CIRCLE 77

SOFTWARE UPDATE

TWX, Telex, and international Telex messages. Through Infomaster, the Western Union data base, users can also obtain continuously updated reports on news, stock, foreign exchange, gold and commodities futures.

Other features enable users to edit messages, and store and retrieve mailing lists and files. The Micro-Telegram system also has re-try logic and answer-back validation to insure that a message is received.

Each package costs $250.

For more information: Apple Computer, 10260 Bandley Dr., Cupertino, CA 95014; (408) 996-1010. **CIRCLE 174**

RJE Package

Synch, a 2780/3780 IBM binary-synchronous software communications package, is available for the TRS-80 Model II.

The package emulates 2770, 2780, and 3780-type bi-synchronous work stations at data rates up to 9600 baud. It supports transparency, buffer expansion (128, 256 and 512 bytes), space compression, processor interrupt (RVI), and multi-point. In addition, the package provides a Remote Job Entry capability, and automatic features allow up to 100 files to be queued for unattended operation.

The price is $500 for software and documentation.

For more information: Westico, 25 Van Zant St., Norwalk, CT 06855; (203) 853-6880. **CIRCLE 175**

LEISURE/HOME

Home Checkbook

Chequemate is a home-checkbook and budget-control program. It provides budgeting with comparison to actuals by graph and report, credit-card charges, outstanding-bill control, shorthand-entry macros, automated-teller transactions and multiple-account capability.

Other features include screen printing, complete access to all data elements and user-defined budget categories. Reports cover account listing, outstanding bills and standard entries.

The program runs on an Apple II Plus with 48k, one to four disk drives and a printer.

The price is $39.95.

For more information: Masterworks Software, 1823 W. Lomita Blvd., Lomita, CA 90717; (213) 539-7486. **CIRCLE 176**

Three Games

Alpha Fighter, Intruder Alert and Giant Slalom are games for the Atari 400 and 800 personal computers. Each requires a joystick and has extensive sound and graphics.

Alpha Fighter requires the player to destroy alien starships passing through his sector of the galaxy. Intruder Alert places the player in the position of avoiding droids while trying to find his escape ship. Giant Slalom pits the player against a downhill skiing course consisting of both open and closed games.

Alpha Fighter and Giant Slalom cost $14.95 on cassette and $18.95 on disk. Intruder Alert costs $16.95 on cassette and $20.95 on disk.

For more information: Dynacomp, 1427 Monroe Ave., Rochester, NY 14618; (716) 442-8960 or (716) 586-7579. **CIRCLE 177**

Egyptian Maze

Copts and Robbers places the user in the tomb of an Egyptian pyramid. The only way out is to find four jew-

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CIRCLE 78

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Shack-80 Model-1 Users:
Restore Reliability

Tired of spontaneous re-booting, "loss" of memory, UL ERROR on programs that are correct, "BAD RAM" or ROM that is good and other symptoms of dirty edge connectors?

CIE Cramolin cleaning kit lets you quickly, safely strip away coatings of high-resistance oxide films built upon ..S-80's non-gold-plated edge fingers, and coat them to reduce further buildup. Contains one bottle cleaner, one lubricant/sealer.

CIE Cramolin $8.95 ($9.49 CA)

Silver Solder Rejuvinates
Shack-80 Edge Connectors

Ratty Radio Shack edge fingers require frequent Cramolin cleaning for system reliability. Tandy did not gold plate them, but after you silver them you can tug cables and jar computer without system reboot!

Kit contains special high-quality flux and 16" (about 1.5 oz) of solder, 5-6% silver, balance tin (contains no cadmium, zinc, or lead). Caution: do not resolder fingers with ordinary solder, or system will be totally unusable!

CIE $4.50 ($4.77 CA)

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5" Unbranded, single-density, 10, in envelopes, fully guaranteed	$19.95*
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5" Wabash SSSD with hub ring	$26.55*
5" Wabash DSDD with hub ring	$$38.98*
Reinforcements, 50 rings for 5"	$7.75*
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Cleaning kits, 3M or FD, 2 disks	$22.46*

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Double disk storage with either Percom or LNW Research plug-in adapters. No soldering. Percom Doubler 2 comes with DoubleDOS TRSDOS varient, is $153.50*. LNDoubler 1 includes DOS-plus deluxe operating system. LNDoubler 5/8, with operating system, allows use of double density with either 5" or 8" drives!, just $207*.

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CIRCLE 79

SOFTWARE UPDATE

els and a statue while avoiding mummies and ghosts that guard treasures and steal jewels.

The game offers a beginner's maze and two advanced mazes. Options include a user-definable keyboard control, sound toggle and a pause feature.

The program requires an Apple II or II Plus with 48k and a disk drive.

The price is $34.95.

For more information: Sirius Software, 2011 Arden Way #2, Sacramento, CA 95825; (916) 929-1939. **CIRCLE 178**

Listing Program

A name, address and phone number program updates lists for home use. To look up listing information, simply type in the first five letters of the last name.

Written in BASIC, the program provides space for last name, first name, title, home phone, business phone, two lines for address, city, state and zip code. In addition, the program automatically loads and runs the integrated programs to add or delete names, change information, make new files, alphabetize a file (but keep the old for backup), and print the information in roster or address-label form.

To run the program, the user does not have to set up the file. The computer defines the file with a reasonable number of characters allowed for each type of information, and stores and retrieves as each program is used. The program instructs the user when to change diskettes, or a single diskette can be used for storage of 128 different names, addresses and phone numbers.

The programs are available, with instructions, on a $5\frac{1}{4}$-inch diskette for the Compucolor II or Intecolor computer.

The price is $27.95 plus tax and postage.

For more information: Metra Instruments, 2056 Bering Dr., San Jose, CA 95131; (408) 297-8530. **CIRCLE 179**

Adventure Game

"Voyage of the Valkyrie" is an interactive adventure game with graphic realism and audio soundtracks.

The game is available for the TRS-80 Model I and III on disk and cassette, and for the Apple with 48k and game paddles in disk only.

Each disk costs $39.95, and each cassette is $34.95.

For more information: Advanced Operating Systems, 450 St. John Rd., Michigan City, IN 46360; (219) 879-4693. **CIRCLE 180**

Cube Game

Magikube, a computer version of Rubik's Cube, is available for the TRS-80 Color Computer.

The user has the option of scrambling the cube himself or working from one of the computer's several levels of scramble. In either case, the user must restore the cube to its original state. The game also has a feature which allows the user to save the cube and continue at another time.

The price is $19.95.

For more information: Computerware, 1472 Encinitas Blvd., Encinitas, CA 92024. **CIRCLE 181**

Space Game

Outpost is a space game where each player must defend his ships and base from enemy torpedos and ships using propulsion jets and shields.

The game features eight levels of play, user-defined keys, sound on/off toggle, escape for temporary interruptions of the game and a restart function. The game requires an Apple II with 48k and one disk drive.

The price is $29.95.

For more information: Sirius Software, 2011 Arden Way #2, Sacramento, CA 95825; (916) 920-1939. **CIRCLE 182**

NEW LITERATURE

BASIC Workbook

Understanding Your C1P/C4P: A Workbook of BASIC Exercises is designed for the Ohio Scientific C1P, SUPERBOARD II, AND CHALLENGER C4P. It introduces the fundamentals of the OSI BASIC calculator and program mode, input and output, data representation and program storage on cassette.

The book describes OSI control and logic including testing and branching, subroutine use and logical operations, and also covers character strings and array handling. Included are exercises and sample programs.

The cost of the book is $7.95 plus $2 shipping and handling.

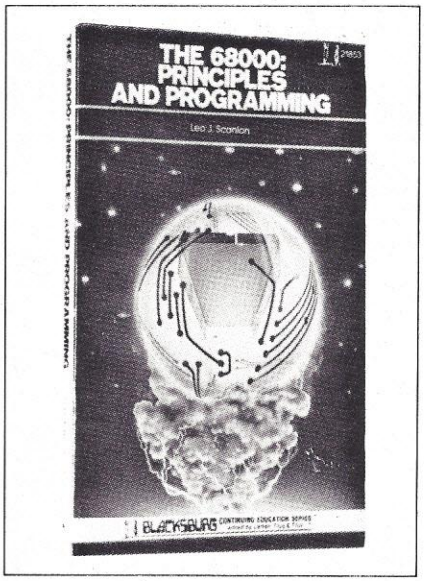
For more information: Total Information Services, P.O. Box 921, Los Alamos, NM 87544; (505) 455-7049.

CIRCLE 183

68000 Software Book

The 68000: Principles and Programming is a textbook designed to systematically guide the reader through fundamental and complex tasks in programming the Motorola 68000 16-bit microprocessor.

The book gives an overview of the 68000 and explains its registers, design, and the Cross-Macro Assembler-addressing modes. Simple and complex program examples are given for math, list and look-up table operations. Each of the pins is described in functional groups followed by processing states, privilege states and the extensive "exception" structure of the 68000. Support circuits and fundamental I/O operations are summarized and currently available system hardware and software products are surveyed.



The book is available for $14.95 plus $1 shipping.

For more information: Group Technology, P.O. Box 87, Check, VA 24072; (703) 651-3153.

CIRCLE 184

Solutions Brochure

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The brochure details several Winchester disks, backup and network systems, and outlines applications for a personal computer — order and word processing, inventory control, accounting, electronic mail, educational applications and professional office record-keeping.

The brochure is free.

For more information: Corvus Systems, 2029 O'Toole Ave., San Jose, CA 95131. **CIRCLE 185**

BASIC Programs

The second edition of *50 Programs in BASIC for the Home, School & Office* is available for business, education and home applications.

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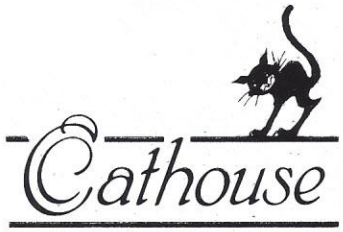

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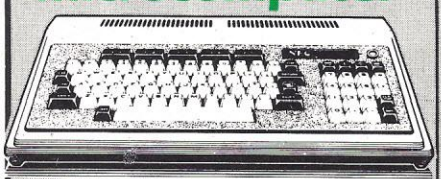

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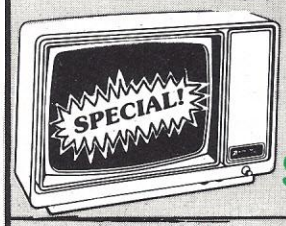

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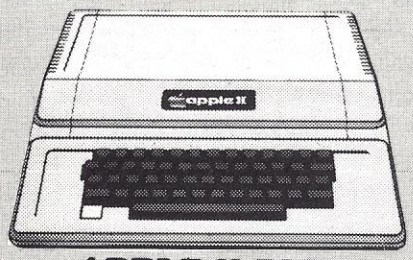

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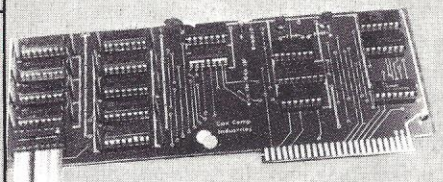

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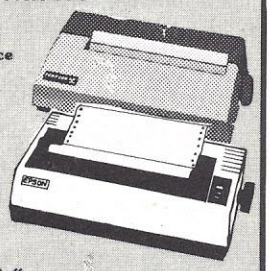

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For more information: ARCsoft Publishers, P.O. Box 132, Woodsboro, MD 21798; (301) 845-8856.
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3 New Titles

Some Common BASIC Programs for the TRS-80 Level II computer contains seven short financial, mathematical and statistical programs that can be keyed into the TRS-80. The price is $14.99.

Microprocessors for Measurement and Control, written in the interest of controlling mechanical equipment with a personal computer, explores techniques for designing mechanical and process equipment without prior knowledge of the machine or assembly language. The cost is $15.99.

Interfacing to S-100 IEEE/696 Microcomputers helps users expand the utility and power of their systems. It describes mechanical, functional and electrical design of the system along with bus interconnections, bussing techniques and interfacing to RAM, ROM and the real world. The cost is $15.

For more information: OSBORNE/McGraw-Hill, 630 Bancroft Way, Berkeley, CA 94710; (415) 548-2805. **CIRCLE 187**

America's newest home appliance: the computer terminal

In a few years, millions of Americans will have computers in their own homes—yet many of us remain functional illiterates when it comes to computers. In this book Joseph Deken, a brilliant computer scientist, presents the computer as a useful tool rather than a mysterious entity. He provides an entertaining, jargon-free guide to how computers work and how they can be used in our daily lives for everything from balancing checkbooks to "working at the office" while still sitting at home (telecommuting). No matter what the future holds in store, this is the *only* computer book you'll ever need! Illustrated with computer drawings. $14.95

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CIRCLE 83

Party planning

continued from page 61

```
10 'THIS PROGRAM WAS WRITTEN BY RICHARD STERN, 5162 SOPHIA AVE,
20 'LOS ANGELES, CA. 91436
30 CLS:CLEAR1000:DEFINTA-Z:DIMA$(25),B(25,25),B$(25),Z(3)
40 PRINTCHR$(23):PRINT@450,"*** PERSONAL PARTY PLANNER ***":FORT=1TO1000:NEXTT:CLS
50 PRINT"     THIS PROGRAM WAS CREATED TO MAKE SOME VERY IMPORTANT"
60 PRINT"DECISIONS FOR YOU.  THESE DECISIONS WILL BE FAIR AND"
70 PRINT"UNBIASED.  THE COMPUTER CAN DECIDE ON GIFT EXCHANGES"
80 PRINT"FOR A SINGLE FESTIVE EVENT OR FOR A SERIES OF HOLIDAYS"
90 PRINT"TO COME SUCH AS CHRISTMAS.  THE PROGRAM CAN HELP YOU PLAN A"
100 PRINT"POT LUCK DINNER OR A 'PROGRESSIVE' PARTY.  IT ALSO CAN"
110 PRINT"PLAN THE ROTATION OF HOMES FOR A BRIDGE OR POKER PARTY.  IT"
120 PRINT"CAN EVEN DECIDE HOW THE CLEAN-UP CHORES SHOULD BE DIVIDED."
130 PRINT
140 PRINT"IN SHORT ONLY THE COMPUTER CAN BE BLAMED FOR MAKING THESE"
150 PRINT"VERY IMPORTANT DECISIONS.
160 PRINT
170 PRINTTAB(4)"     WHILE YOU WERE READING THIS DESCRIPTION A"
180 PRINTTAB(4)"MACHINE LANGUAGE PROGRAM WAS BEING LOADED.  WAIT"
190 PRINTTAB(4)"UNTIL THE COMPUTER TELLS YOU TO PROCEED....":GOSUB60000
200 GOSUB50000
210 CLS:PRINTTAB(23)"PROGRAM SELECTION"
220 PRINT:PRINT
230 PRINTTAB(10)"1  CHRISTMAS GIFT EXCHANGE LIST"
240 PRINT:PRINTTAB(10)"2  POT LUCK DINNER"
250 PRINT:PRINTTAB(10)"3  PROGRESSIVE PARTY"
260 PRINT:PRINTTAB(10)"4  POKER OR BRIDGE PARTY"
270 PRINT:PRINTTAB(10)"5  PARTY CLEAN-UP CHORES"
280 PRINT:PRINTTAB(10)"6  EXIT PROGRAM"
290 GOSUB50040:S=VAL(S$):IFS>6ORS<1GOTO290
300 ONSGOTO1000,2000,3000,4000,5000,310
310 END
1000 CLS:PRINT@17,"CRISTMAS GIFT EXCHANGE LIST"
1010 PRINT:PRINT"     THIS PROGRAM WILL SELECT PERSONS FOR A GIFT EXCHANGE.  IT"
1020 PRINT"IS DESIGNED TO RANDOMLY SELECT ONE PERSON TO WHOM A SECOND"
1030 PRINT"PERSON WILL GIVE A GIFT.  NO ONE WILL BE GIVEN THEIR OWN"
1040 PRINT"NAME, NOR WILL ANY ONE RECEIVE MORE THAN ONE GIFT.  THE"
1050 PRINT"PROGRAM WILL ALSO SELECT EXCHANGES FOR SUCCEEDING YEARS ON A"
1060 PRINT"RANDOM BASIS, HOWEVER NO ONE WILL RECEIVE A GIFT FROM SOMEONE"
1070 PRINT"WHO HAS PREVIOUSLY GIVEN THEM A GIFT.  IT IS MATHEMATICALLY"
1080 PRINT"POSSIBLE TO SELECT GIFTS FOR UP TO ONE LESS THAN THE NUMBER"
1090 PRINT"OF PERSONS IN THE EXCHANGE...."
1100 GOSUB50000
1110 CLS:PRINT"     AS YOU ARE REQUESTED PLEASE ENTER THE NAME OF THE PERSONS"
1120 PRINT"IN THE EXCHANGE.  WHEN YOU ARE DONE WITH ALL YOUR ENTRIES"
1130 PRINT"TYPE 'END' FOR THE LAST NAME."
1140 PRINT
1150 N=1
1160 PRINT"THE NAME OF PERSON NUMBER ";N;" IS ";:INPUTA$(N)
1170 IF A$(N)="END"THEN1180ELSEN=N+1:GOTO1160
1180 N=N-1
```

```
1190 PRINT:PRINT"WHAT IS THE FIRST YEAR IN WHICH YOU WOULD LIKE TO EXCHANGE"
1200 PRINT"GIFTS. ";:INPUTYE
1210 PRINT:PRINT"HOW MANY YEARS IN THE FUTURE DO YOU WISH THE COMPUTER TO"
1220 PRINT"SELECT EXCHANGES.  THE NUMBER CANNOT EXCEED ";N-1;" YEARS.";:INPUTY
1230 IFY>N-1GOTO1210
1240 CLS:PRINT@475,"SELECTING NAMES":GOSUB50090
1250 FORW=1TOY:CLS:ST=1
1260 PRINT@25,"CHRISTMAS ";YE:PRINT
1270 FORV=1TON
1280 B$(V)=A$(B(V,W))
1290 PRINTA$(V);" WILL GIVE A PRESENT TO ";B$(V);" THIS YEAR."
1300 IFV=ST*13GOSUB50000:ST=ST+1:GOTO1320
1310 IFV=NGOSUB50000
1320 NEXTV
1330 YE=YE+1
1340 NEXTW
1350 CLS:PRINTCHR$(23):PRINT@456,"*** MERRY CHRISTMAS ***":FORT=1TO1000:NEXTT:GOTO210
2000 CLS:PRINT@25,"POT LUCK DINNER"
2010 PRINT:PRINT"     THIS PROGRAM WILL RANDOMLY MATCH GUESTS AND ITEMS TO BE"
2020 PRINT"BROUGHT TO A POT LUCK DINNER.  NO ONE WILL BE ASKED TO BRING"
2030 PRINT"TWO ITEMS.  THE NUMBER OF ITEMS MUST NOT EXCEED THE NUMBER"
2040 PRINT"OF PERSONS, BUT A LESSER NUMBER IS ALL RIGHT."
2050 GOSUB50000
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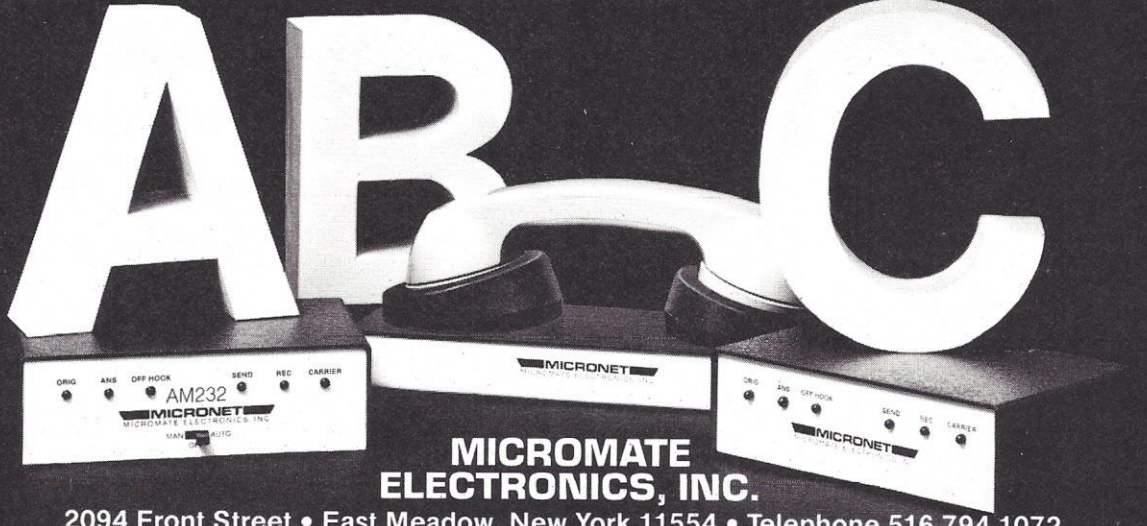

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eight	seventy	40ms silence	gallon	limit	percent	stop	j
nine	eighty	80ms silence	go	low	please	than	k
ten	ninety	160ms silence	gram	lower	plus	the	l
eleven	hundred	320ms silence	great	mark	point	time	m
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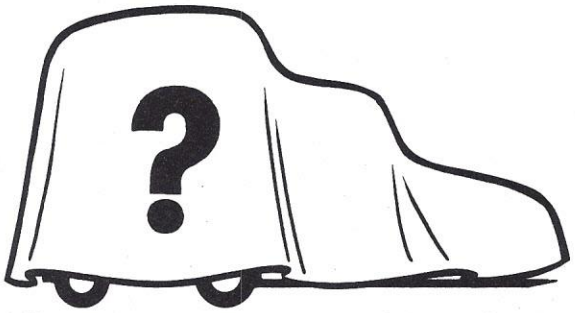
CIRCLE 85

PROGRAM LISTINGS

```
2060 CLS:PRINT"     AS YOU ARE REQUESTED PLEASE ENTER
     THE NAMES OF THE"
2070 PRINT"GUESTS IN THE PARTY.  WHEN YOU ARE DONE WITH
     ALL YOUR"
2080 PRINT"ENTRIES, TYPE 'END' FOR THE LAST NAME."
2090 PRINT:N=1
2100 PRINT"THE NAME OF GUEST NUMBER ";N;" IS ";:INPUTA$(N)
2110 IFA$(N)="END"THENGOTO2120ELSEN=N+1:GOTO2100
2120 N=N-1
2130 CLS:PRINT"     AS YOU ARE REQUESTED PLEASE ENTER
     THE ITEMS WHICH YOU"
2140 PRINT"WISH THE GUESTS TO BRING.  IF, FOR EXAMPLE,
     YOU WANT TWO"
2150 PRINT"VEGETABLES, YOU MUST ENTER THE ITEM TWICE.
     TYPE 'END' AS"
2160 PRINT"BEFORE TO END THE LIST.  REMEMBER, DO NOT
     EXCEED ";N;" ITEMS."
2170 PRINT:IT=1
2180 IFIT=N+1THENGOTO2210
2190 PRINT"ITEM NUMBER ";IT;" IS ";:INPUTB$(IT)
2200 IFB$(IT)="END"THEN2210ELSEIT=IT+1:GOTO2180
2210 IT=IT-1
2220 IFIT=NGOTO2260
2230 FORJ=IT+1TON
2240 B$(J)="NOTHING"
2250 NEXTJ
2260 CLS:PRINT@478,"MATCHING"
2270 Y=1:GOSUB50080
2280 CLS:ST=1
2290 PRINT@25,"POT LUCK DINNER":PRINT
2300 FORV=1TON
2310 PRINTA$(V);" WILL BRING ";B$(B(V,1));" TO THE DINNER."
2320 IFV=ST*13GOSUB50000:ST=ST+1:GOTO2340
2330 IFV=NGOSUB50000
2340 NEXTV
2350 CLS:PRINTCHR$(23):PRINT@458,"*** BON APPETIT ***"
2360 FORT=1TO1000:NEXTT:GOTO210
3000 CLS:PRINT@24,"PROGRESSIVE PARTY"
3010 PRINT:PRINT"     THIS PROGRAM WILL DECIDE THE ORDER
     OF A PROGRESSIVE"
3020 PRINT"PARTY, THAT IS, A PARTY WHERE ALL GUESTS
     MEET IN SOMEONE'S"
3030 PRINT"HOME FOR COCKTAILS.  THEY MEET IN A SECOND HOME
     FOR THE"
3040 PRINT"NEXT COURSE FOLLOWED BY ADDITIONAL COURSES IN
     OTHER HOMES."
3050 GOSUB50000
3060 CLS:PRINT"     AS YOU ARE REQUESTED PLEASE INDICATE
     THE COURSES WHICH"
3070 PRINT"WILL COMPRISE THE PARTY, STARTING WITH THE
     FIRST COURSE AND"
3080 PRINT"PROCEEDING IN ORDER.  TYPE 'END' AFTER YOU
     HAVE ENTERED THE"
```

MAJOR OVERHAUL.



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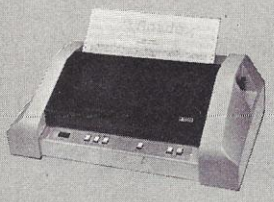

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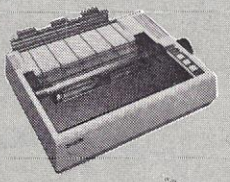

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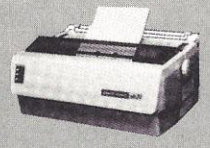

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```
5250 J=1:ST=1
3090 PRINT"LAST COURSE.  PLEASE KEEP IN MIND THAT THERE MUST BE AT LEAST"
3100 PRINT"AS MANY GUESTS AS THERE ARE COURSES."
3110 PRINT:CO=1
3120 PRINT"COURSE NUMBER ";CO;" WILL BE";:INPUTA$(CO)
3130 IFA$(CO)="END"THENGOTO3140ELSECO=CO+1:GOTO3120
3140 CO=CO-1
3150 CLS:PRINT"    AS YOU ARE REQUESTED PLEASE ENTER THE NAMES OF THE GUESTS."
3160 PRINT"THERE MUST BE AT LEAST AS MANY GUESTS AS THERE ARE COURSES"
3170 PRINT"BUT THERE MAY BE MORE GUESTS.  WHEN YOU ARE FINISHED ENTERING"
3180 PRINT"THE NAMES OF THE GUESTS, TYPE 'END' FOR THE LAST NAME."
3190 PRINT"YOU MUST HAVE AT LEAST ";CO;" GUESTS."
3200 PRINT:N=1
3210 PRINT"THE NAME OF GUEST NUMBER ";N;" IS";:INPUTB$(N)
3220 IFB$(N)="END"THEN3230ELSEN=N+1:GOTO3210
3230 N=N-1:IFB$(N+1)="END"ANDN<COTHENPRINT"ADDITIONAL GUESTS ARE NEEDED.":N=N+1:GOTO3210
3240 CLS:PRINT@478,"DECIDING"
3250 Y=1:GOSUB50080
3260 CLS:ST=1
3270 PRINT@24,"PROGRESSIVE PARTY"
3280 PRINT
3290 FORV=1TOCO
```


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CIRCLE 88

```
3300 PRINT"COURSE NUMBER ";V;", ";A$(V);", WILL BE SERVED AT ";B$(B(V,1));"'S HOME."
3310 IFV=ST*13GOSUB50000:ST=ST+1:GOTO3230
3320 IFV=COGOSUB50000
3330 NEXTV
3340 CLS:PRINTCHR$(23):PRINT@454,"*** DRIVE CAREFULLY ***"
3350 FORT=1TO1000:NEXTT:GOTO210
4000 CLS:PRINT@21,"POKER OR BRIDGE PARTY"
4010 PRINT:PRINT"    THIS PROGRAM WILL SELECT THE HOST OR HOSTESS FOR A SERIES"
4020 PRINT"OF BRIDGE OR POKER PARTIES.  ANY NUMBER OF PEOPLE MAY PAR-"
4030 PRINT"TICIPATE AND THE PROGRAM WILL SELECT THE ORDER OF THE PARTIES"
4040 PRINT"FOR AS FAR INTO THE FUTURE AS IS MATHEMATICALLY POSSIBLE."
4050 GOSUB50000
4060 CLS:PRINT"     AS YOU ARE REQUESTED PLEASE ENTER THE NAMES OF ALL"
4070 PRINT"PERSONS IN THE PARTY.  TYPE 'END FOR THE LAST PERSON."
4080 PRINT:N=1
4090 PRINT"THE NAME OF PERSON NUMBER ";N;" IS ";:INPUTA$(N)
4100 IFA$(N)="END"THENGOTO4110ELSEN=N+1:GOTO4090
4110 N=N-1
4120 CLS:PRINT@466,"SELECTING HOST AND HOSTESSES"
4130 Y=N:GOSUB50080
4140 CLS:PRINT@21,"POKER OR BRIDGE PARTY"
4150 J=1:ST=1:K=1:PRINT
4160 FORW=1TON
4170 FORV=1TON
4180 PRINT"MEETING NUMBER ";J;" WILL TAKE PLACE AT ";A$(B(V,W));"'S HOME."
4190 IFK=ST*13GOSUB50000:ST=ST+1
4200 J=J+1:K=K+1:NEXTV:GOSUB50000:PRINT:K=1:ST=1:NEXTW
4210 CLS:PRINTCHR$(23):PRINT@462,"*** GOOD LUCK ***"
4220 FORT=1TO1000:NEXTT:GOTO210
5000 CLS:PRINT@22,"PARTY CLEAN-UP CHORES"
5010 PRINT:PRINT"    THIS PROGRAM WILL DECIDE HOW THE PARTY CLEAN-UP CHORES"
5020 PRINT"WILL BE DISTRIBUTED.  YOU WILL BE ASKED TO SELECT FIRST THE"
5030 PRINT"UNFORTUNATE PEOPLE AND SECOND THE CHORES.  YOU MAY LIST ANY"
5040 PRINT"NUMBER OF PEOPLE AND ANY NUMBER OF CHORES.  THE COMPUTER WILL"
5050 PRINT"DISTRIBUTE THE CHORES RANDOMLY AND AS EVENLY AS POSSIBLE."
5060 GOSUB50000
5070 CLS:PRINT"     PLEASE ENTER THE PEOPLE AS REQUESTED.  TYPE 'END' FOR THE"
5080 PRINT"LAST PERSON"
5090 PRINT:N=1
5100 PRINT"THE NAME OF PERSON NUMBER ";N;" IS ";:INPUTB$(N)
5110 IFB$(N)="END"THENGOTO5120ELSEN=N+1:GOTO5100
5120 N=N-1
5130 CLS:PRINT@473,"MIXING UP NAMES"
5140 Y=1:GOSUB50080
5150 FORV=1TON
5160 A$(V)=B$(B(V,1))
5170 NEXTV
5180 CLS:PRINT"     PLEASE ENTER THE CHORES.  TYPE 'END' FOR THE LAST CHORE."
5190 PRINT:CH=1
5200 PRINT"CHORE NUMBER ";CH;" IS ";:INPUTB$(CH)
```

```
5210 IFB$(CH)="END"THENGOTO5220ELSECH=CH+1:GOTO5200
5220 CH=CH-1:CLS:PRINT@472,"MIXING UP CHORES"
5230 Y=1:TE=N:N=CH:GOSUB50080:N=TE
5240 CLS:PRINT@25,"CLEAN-UP CHORES":PRINT
5260 FORI=1TON
5270 PRINTA$(I);" WILL ";B$(B(J,1))
5280 IFJ=CHGOSUB50000:GOTO5310
5290 IFJ=ST*13GOSUB50000:ST=ST+1
5300 J=J+1:NEXTI:GOTO5260
5310 CLS:PRINTCHR$(23):PRINT@466,"*** SORRY ***"
5320 FORT=1TO1000:NEXTT:GOTO210
50000 FORT=1TO25:PRINT@985,"PRESS ENTER";:NEXTT
50010 D$=INKEY$:IFD$<>""THEN50030
50020 PRINTCHR$(15);:PRINTCHR$(29);:PRINTCHR$(30);:FORT=1TO25:NEXTT:GOTO50000
50030 CLS:RETURN
50040 FORT=1TO25:PRINT@980,"PLEASE MAKE SELECTION";:NEXTT
50050 S$=INKEY$:IFS$<>""THEN50070
50060 PRINTCHR$(15);:PRINTCHR$(29);:PRINTCHR$(30);:FORT=1TO25:NEXTT:GOTO50040
50070 RETURN
50080 POKE32657,00:POKE32658,00:GOSUB50090:POKE32657,40:POKE32658,223:RETURN
50090 Z=0:Z(0)=N:Z(1)=Y:Z(2)=VARPTR(B(1,1)):Z(3)=VARPTR(B(1,2))-VARPTR(B(1,1))
50100 Z=USR(VARPTR(Z(0))):RETURN
60000 FORI=32512TO32749:READJ
60010 POKEI,J:NEXTI
60020 POKE16526,13:POKE16527,127
60030 RETURN
60040  DATA 0, 0, 0, 0, 0, 0, 0, 0
60050  DATA 0, 0, 0, 0, 0, 205, 127, 10, 126, 50
60060  DATA 0, 127, 22, 0, 95, 6, 2, 203, 34, 175
60070  DATA 203, 35, 48, 2, 203, 194, 16, 245, 237, 83
60080  DATA 11, 127, 35, 35, 126, 50, 1, 127, 35, 35
60090  DATA 94, 35, 86, 237, 83, 3, 127, 237, 83, 5
60100  DATA 127, 237, 83, 7, 127, 35, 94, 35, 86, 237
60110  DATA 83, 9, 127, 62, 0, 50, 2, 127, 58, 2
60120  DATA 127, 60, 50, 2, 127, 71, 58, 1, 127, 144
60130  DATA 216, 42, 3, 127, 34, 7, 127, 58, 0, 127
60140  DATA 71, 42, 7, 127, 34, 3, 127, 14, 1, 205
60150  DATA 211, 1, 237, 91, 11, 127, 27, 122, 179, 40
60160  DATA 232, 62, 2, 50, 175, 64, 62, 0, 50, 34
60170  DATA 65, 58, 0, 127, 50, 33, 65, 197, 213, 229
60180  DATA 205, 201, 20, 225, 209, 193, 185, 40, 223, 197
60190  DATA 229, 245, 6, 0, 175, 203, 33, 48, 2, 203
60200  DATA 192, 62, 0, 119, 241, 237, 185, 225, 193, 40
60210  DATA 201, 217, 245, 58, 1, 127, 71, 241, 42, 3
60220  DATA 127, 237, 91, 9, 127, 245, 175, 237, 82, 241
60230  DATA 237, 91, 5, 127, 8, 124, 146, 32, 2, 125
60240  DATA 147, 56, 8, 8, 190, 40, 29, 16, 228, 24
60250  DATA 1, 8, 217, 119, 35, 35, 12, 34, 3, 127
60260  DATA 16, 146, 42, 7, 127, 237, 91, 9, 127, 25
60270  DATA 34, 3, 127, 195, 76, 127, 217, 195, 114, 127
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                                00200           ORG     7F00H
7F00    00                      00300 PERSON:   DEFB    00
7F01    00                      00400 YEAR:     DEFB    00
7F02    00                      00500 YRCNT:    DEFB    00
7F03    0000                    00600 ADDR:     DEFW    0000
7F05    0000                    00700 LOADDR:   DEFW    0000
7F07    0000                    00800 ADDR1:    DEFW    0000
7F09    0000                    00900 YRDEL:    DEFW    0000
7F0B    0000                    01000 RNDTRY:   DEFW    0000
7F0D    CD 0A7F                 01100 RNDAT::   CALL    0A7FH
7F10    7E                      01200           LD      A,(HL)
7F11    32 7F00                 01300           LD      (PERSON),A
7F14    16 00                   01400           LD      D,00
7F16    5F                      01500           LD      E,A
7F17    06 02                   01600           LD      B,02H
7F19    CB 22                   01700 MULT4:    SLA     D
7F1B    AF                      01800           XOR     A
7F1C    CB 23                   01900           SLA     E
7F1E    30 02                   02000           JR      NC,BYPASS
7F20    CB C2                   02100           SET     0,D
7F22    10 F5                   02200 BYPASS:   DJNZ    MULT4
7F24    ED 53 7F0B              02300           LD      (RNDTRY),DE
7F28    23                      02400           INC     HL
7F29    23                      02500           INC     HL
7F2A    7E                      02600           LD      A,(HL)
7F2B    32 7F01                 02700           LD      (YEAR),A
7F2E    23                      02800           INC     HL
7F2F    23                      02900           INC     HL
7F30    5E                      03000           LD      E,(HL)
7F31    23                      03100           INC     HL
7F32    56                      03200           LD      D,(HL)
7F33    ED 53 7F03              03300           LD      (ADDR),DE
7F37    ED 53 7F05              03400           LD      (LOADDR),DE
7F3B    ED 53 7F07              03500           LD      (ADDR1),DE
7F3F    23                      03600           INC     HL
7F40    5E                      03700           LD      E,(HL)
7F41    23                      03800           INC     HL
7F42    56                      03900           LD      D,(HL)
7F43    ED 53 7F09              04000           LD      (YRDEL),DE
7F47    3E 00                   04100           LD      A,00
7F49    32 7F02                 04200           LD      (YRCNT),A
7F50    32 7F02                 04500           LD      (YRCNT),A
```

```
7F4C    3A 7F02          04300   NXTYR:  LD      A,(YRCNT)
7F4F    3C               04400           INC     A
7F53    47               04600           LD      B.A
7F54    3A 7F01          04700           LD      A,(YEAR)
7F57    90               04800           SUB     B
7F58    D8               04900           RET     C
7F59    2A 7F03          05000           LD      HL,(ADDR)
7F5C    22 7F07          05100           LD      (ADDR1),HL
7F5F    3A 7F00          05200   RETRY:  LD      A,(PERSON)
7F62    47               05300           LD      B,A
7F63    2A 7F07          05400           LD      HL,(ADDR1)
7F66    22 7F03          05500           LD      (ADDR),HL
7F69    0E 01            05600           LD      C,01H
7F6B    CD 01D3          05700           CALL    01D3H
7F6E    ED 5B 7F0B       05800   NEXT:   LD      DE,(RNDTRY)
7F72    1B               05900   TRYAGN: DEC     DE
7F73    7A               06000           LD      A,D
7F74    B3               06100           OR      E
7F75    28 E8            06200           JR      Z,RETRY
7F77    3E 02            06300           LD      A,02H
7F79    32 40AF          06400           LD      (40AFH),A
7F7C    3E 00            06500           LD      A,00
7F7E    32 4122          06600           LD      (4122H),A
7F81    3A 7F00          06700           LD      A,(PERSON)
7F84    32 4121          06800           LD      (4121H),A
7F87    C5               06900           PUSH    BC
7F88    D5               07000           PUSH    DE
7F89    E5               07100           PUSH    HL
7F8A    CD 14C9          07200           CALL    14C9H
7F8D    E1               07300           POP     HL
7F8E    D1               07400           POP     DE
7F8F    C1               07500           POP     BC
7F90    B9               07600           CP      C
7F91    28 DF            07700           JR      Z,TRYAGN
7F93    C5               07800           PUSH    BC
7F94    E5               07900           PUSH    HL
7F95    F5               08000           PUSH    AF
7F96    06 00            08100           LD      B,00H
7F98    AF               08200           XOR     A
7F99    CB 21            08300           SLA     C
7F9B    30 02            08400           JR      NC,PASS
7F9D    CB C0            08500           SET     0,B
7F9F    3E 00            08600   PASS:   LD      A,00
7FA1    77               08700           LD      (HL),A
7FA2    F1               08800           POP     AF
7FA3    ED B9            08900           CPDR
7FA5    E1               09000           POP     HL
7FA6    C1               09100           POP     BC
7FA7    28 C9            09200           JR      Z,TRYAGN
7FB8    AF               10100           XOR     A
7FB9    ED 52            10200           SBC     HL,DE
```

```
7FA9    D9                  09300          EXX
7FAA    F5                  09400          PUSH    AF
7FAB    3A 7F01             09500          LD      A,(YEAR)
7FAE    47                  09600          LD      B,A
7FAF    F1                  09700          POP     AF
7FB0    2A 7F03             09800          LD      HL,(ADDR)
7FB3    ED 5B 7F09          09900  LOOK:   LD      DE,(YRDEL)
7FB7    F5                  10000          PUSH    AF
7FBB    F1                  10300          POP     AF
7FBC    ED 5B 7F05          10400          LD      DE,(LOADDR)
7FC0    08                  10500          EX      AF,AF'
7FC1    7C                  10600          LD      A,H
7FC2    92                  10700          SUB     D
7FC3    20 02               10800          JR      NZ,TEST
7FC5    7D                  10900          LD      A,L
7FC6    93                  11000          SUB     E
7FC7    38 08               11100  TEST:   JR      C,NMTCH
7FC9    08                  11200          EX      AF,AF'
7FCA    BE                  11300          CP      (HL)
7FCB    28 1D               11400          JR      Z,MATCH
7FCD    10 E4               11500          DJNZ    LOOK
7FCF    18 01               11600          JR      NOMTCH
7FD1    08                  11700  NMTCH:  EX      AF,AF'
7FD2    D9                  11800  NOMTCH: EXX
7FD3    77                  11900          LD      (HL),A
7FD4    23                  12000          INC     HL
7FD5    23                  12100          INC     HL
7FD6    0C                  12200          INC     C
7FD7    22 7F03             12300          LD      (ADDR),HL
7FDA    10 92               12400          DJNZ    NEXT
7FDC    2A 7F07             12500          LD      HL,(ADDR1)
7FDF    ED 5B 7F09          12600          LD      DE,(YRDEL)
7FE3    19                  12700          ADD     HL,DE
7FE4    22 7F03             12800          LD      (ADDR),HL
7FE7    C3 7F4C             12900          JP      NXTYR
7FEA    D9                  13000  MATCH:  EXX
7FEB    C3 7F72             13100          JP      TRYAGN
                            13200          END     RNDAT

MACROS:

SYMBOLS:
ADDR    7F03    ADDR1   7F07    BYPASS  7F22    LOADDR  7F05
LOOK    7FB3    MATCH   7FEA    MULT4   7F19    NEXT    7F6E
NMTCH   7FD1    NOMTCH  7FD2    NXTYR   7F4C    PASS    7F9F
PERSON  7F00    RETRY   7F5F    RNDAT   7F0DI   RNDTRY  7F0B
TEST    7FC7    TRYAGN  7F72    YEAR    7F01    YRCNT   7F02
YRDEL   7F09

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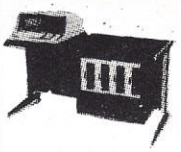

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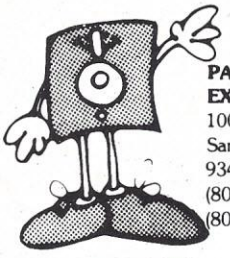

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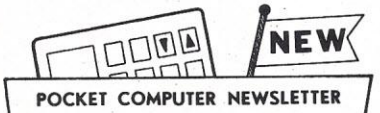

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ADVERTISERS' INDEX

Page No.		Circle No.
80	Aardvark Technical Services	94
30	Addison-Wesley Publishing Co	14
144	Addmaster Corporation	
102,103	AMSI	51
58	Alpha Byte Stores	24
9	Amdek	5
144	American Computer Exchange	
126,127	Anadex	78
82,75	Apple Computer Inc.	30
6	ASAP Computer Products	4
100	Automated Equipment, Inc.	49
81	Business Planning Systems	33
77	CPU Shop	31
88	Chang Labs	36
117	Charles Mann & Associates	67
118	CLOAD Magazine, Inc.	68
115	ComData Systems	64
Cover IV	Commodore International	92
121	COMPUMAX	72
110,111	CompuServe	58
131	Computer Discount of America	82
128	Computer Information Exchange Inc.	79
130	Consumer Computers	81
14	Corvus Systems	8
112	Custom Electronics	59
101	Cybernetics	50
120	D.J. 'Al' Systems Ltd	71
125	DATA TRAIN INC.	77
49	Designer Software	20
112	Dymarc Industries	60
69,137	Edu-Ware Services, Inc.	25,88
115	Ellis Computing	63
109	Epson America, Inc.	56
93	Galactic Software Ltd	
140	Hayden Book Co., Inc	89
38	Hayes MicroComputer Products Inc.	57
96	Howard Industries	48
35,51	Howard Software Services	16,21
22	Konan Corporation	69
Cover III	Leading Edge Products, Inc.	91
71,99	Lifeboat Associates	27,42
94	Little Genius, Inc.	44
33	Lobo Drives, International	15
45	Logo Computer Systems	19
121	Mannfred Electronics	73
78	Maxell Corporation of America	32
10	Meta Technologies	36
148	METATRONICS	90
92	MicroAge Computer Stores/PGI	40
72	Micro Applications Group	28
106	Micro Business World, Inc.	54
124	MicroCompatible	75
85	MicroCon SoftwareCenters, Inc.	35
89	Microed	37
91,135	Micro Lab	39,86
125	MICROMAIL	76
97	Micro Management Systems Inc.	45
133	Micromate	
24	MicroPro International	12
17	Microsoft Consumer Products	7
13	Microcomputer Technology, Inc./ MTI	9
113	MICROTEK	61
1	Mountain Computers	2
73,90	Muse Software	29,38
Cover II	NEC America, Inc.	1
134	Netronic R&D, LTD	85
116	Okidata	65
136	Orange Micro, Inc.	87
42	Osborne Computer Corporation	18
86,87	Personal Software Inc	6
57	Prodigy Systems, Inc.	23
20	Qantex/Div. North Atlantic Industries, Inc.	11
104	Quality Software	52
70	Racet Computers, Ltd.	26,94
4	Radio Shack	3
98	Riverbank Software	47
105	Simutek Computer Products	53
122,123	Sinclair Research, Ltd.	
54	Software Publishing Corporation	22
114	Stoneware Microcomputer Products	62
124	Synapse Video	82
18	Systems Plus	10
5	Synertek Systems Corp.	9
36,37	Tarbell Electronics	17
79	The Microperipheral Corp.	93
117	TransNet Corporation	66
98	Unicomm Marketing Corp.	46
129	Vanguard Software	80
95	Vector Graphic	43
25	Videx	13
107	Western Digital	55
82	Wesper Microsystems	34
119	Westico, Inc.	70
131	William Morrow and Co.	83
144	Xcel	

More information can be obtained by circling the Reader Service Number or by contacting your local dealers, listed on Page 146.

General Store Section
Subscriber Copies Only

ASAP Computer Products 82-9
Adventure International 82-12
Alpha Byte Stores 82-16,82-17
American Square Computers 82-3
Aspen Ribbons 82-12
BT Enterprises 82-8
Bonita Computer Software 82-12
CPU Shop 82-21
Compendium/Epicurious 82-27
Communications Electronics 82-22
Computer Case 82-30
Computer Mail Order 82-26
Computer Warehouse 82-10
Computers Wholesale 82-18
Data Train Inc. 82-27
Dr. Daley's Software 82-29
Dynacomp 82-6,82-7
Electronic Specialists 82-30
Hayden Book Co. 82-24,82-25
Insiders Software 82-30
Jade Computer Products 82-2
M.B. Rowe 82-14
Micro Management 82-27
Mini Micro Mart 82-5
Multi Business Systems 82-29
NIK International 82-19
Northern Technology Books 82-4
Palomar Computer Products 82-11
Pan American Electronics 82-8
Perry Gas & Oil 82-14
Personal Computer Systems 82-31
Personal Computing Magazine 82-28
Pickles & Trout 82-14
Program Design 82-8
Program Store 82-23
Programs Unlimited 82-19
Soft Sector Marketing 82-19
SoftSide/Envyrnments 82-20
Spectrum Software 82-32
The Stocking Source 82-15
VR Data 82-13

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Book Nook (913) no listing
Computerland (913) 492-8882
Computerland Hutchinson (316) 662-6832
Computerland/Topeka (913) 267-6530
High Technology/Wichita (316) 262-0315
Micro Age Computer Store (913) 823-7596
Online Computer Centers (913) 341-6651
Personal Computer Ctr. (913) 649-5942
KENTUCKY
Computer Emporium (502) 589-9482
Computer Place (606) 276-3594
Heathkit Electr. (502) 245-7811
LOUISIANA
Computer Shoppe Inc. (504) 454-6600
Radio Shack (318) 436-6720
MASSACHUSETTS
Compumart (617) 491-2700
Computer City (617) 755-5464
Computer City (617) 875-8126
Computer City (617) 273-3146
Computer City (617) 242-3350
Computer City (617) 826-9217
Computerland/Boston (617) 235-6652
Computer Source (413) 443-7181
Computer Store (617) 232-5470
Computer Store (617) 354-4599
Heathkit (617) 531-9332
Heathkit Electrs. (617) 237-1510
New England Electr. Ctr. (413) 444-6901
Out of Town News (617) 354-7777
Palace Spa (617) 783-5858
Retail Computer Ctr. (413) 589-0106
Small Business Group (617) 692-3800
YDI Electrs. (617) 449-1005
MAINE
Home Port Computers (207) 873-2192
MARYLAND
Bethesda Computers (301) 657-1992
Chafitz (301) 340-3300
Computer Crossroads (301) 730-5513
Computers Etc. (301) 268-5801
Computers Etc. (301) 268-5801
Computers Etc. (301) 296-0520
Computerland (301) 340-8484
Computerland/Towson (301) 337-5555
Computer Unlimited (301) 321-1553
Heathkit Electrs. (301) 881-5420
Logical Choice (301) 465-3175
Micro Age (301) 762-7585
Muse Computer Ctr. (301) 659-7212
Program Store/Baltimore (301) 944-0200
Radio Shack (301) 224-2900
The Comm. Center (301) 792-0600
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Community News (517) 321-8797
Community Newscenter (517) 694-0490
Community Newscenter (517) 349-3510
Computer Center (313) 422-2570
Computer Connection (313) 447-4470
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Computerland/Southfield (313) 356-8111
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Computerland	(612) 933-8841
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Computer Pro	(817) 654-3360
Computer Shop	(512) 828-0553
Computer Solutions	(512) 341-8851
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Computer Technique	(713) 947-9633
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Computer Video Sys.	(214) 423-3654
Electrotex	(512) 735-9271
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Heathkit	(512) 341-8876
Heathkit Electrs. Ctr.	(214) 826-4053
KA Electr. Sales	(512) 458-2257
Lone Star News	(713) 772-9007
Micro Age Computer Store	(602) 894-9247
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Micro Age Computer Store	(713) 270-9647
Micro Computer Shoppe	(512) 855-4516
Northwest Newstand	(713) 681-7310
Percom	(214) 272-3421
Software & Peripherals Ltd.	(817) 566-3888
Waco Comm.	(817) 772-8550
Waghalter Books	(713) 627-9970
Westheimer Newstand	(713) 781-7793
UTAH	
Central Utah Electrs.	(801) 373-7522
VIRGINIA	
Arcade Electrs.	(703) 256-4610
Arlington Electric Wholesale	(703) 524-2412
Computerland/Tysons Corner	(703) 893-0424
Computer Place	(703) 982-3661
Computers Plus	(703) 971-1996
Computer Store	(617) 272-0294
H.B. Computer Ctr.	(703) 295-1975
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